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The Final Diagnosis of President Cleveland's Lesion

JOHN J. BROOKS, HORATIO T. ENTERLINE and GONZALO E. APONTE†

Introduction

TO this day the diagnosis of a tumor removed from a president of the United States remains clouded in mystery. The patient was President Grover Cleveland, the year, 1893. Aside from the secrecy which surrounded the operation for the next quarter century, conflicting accounts by the participants have caused confusion as to the diagnosis of the President's disease. Exactly what was removed from Mr. Cleveland at that time has remained a puzzle to this day. Was the ulcerating lesion of the palate actually a tumor, or could it have been some benign inflammatory condition? If it was a tumor, exactly what pathologic entity, in modern terms, did it represent? Was the lesion benign or malignant? If malignant, was it a carcinoma or a sarcoma? If malignant, why was there no recurrence in the remaining fifteen years of Cleveland's life?

In an attempt to resolve these questions of historical and medical interest, we have reviewed the entire history of President Cleveland's operation and have subjected the excised tissue to modern pathologic examination and interpretation. In order to present this matter in an orderly fashion, we shall first attempt to set the historical stage, and then detail all aspects of the illness, using the form of the standard case report. Before describing the actual lesion, we shall review the conflicting original diagnoses. In addition, we shall summarize the history of prior requests to obtain diagnostic tissue from the Mütter Museum.

ACKNOWLEDGMENTS

This study was initiated by the late Gonzalo E. Aponte, M.D., former Chairman of Pathology at Jefferson Medical School, in 1975, when he was Chairman of the Committee on the Mütter Museum of the College of Physicians of Philadelphia. The authors acknowledge his contributions and wish to dedicate this article to him.

The authors thank Cleirach Partin, who prepared sketches reconstructing the original lesion. We are also grateful to Jack Edeiken, M.D., Professor and Chairman of Radiology at Thomas Jefferson University for interpreting roentgenograms of the specimen. Much assistance was provided by the staff of the Francis C. Wood Institute of the College of Physicians of Philadelphia, particularly by Elizabeth Moyer and Gretchen Worden of the Mütter Museum and Christine Ruggere of the Historical Collections of the Library. The authors are indebted to these individuals.

Authors' Note

We intend to donate the histological slides and paraffin blocks made from Cleveland's tissue to the Mütter Museum, so that the entire case shall be safely stored as a unit.

Historical Setting

The complete story of the secret operations on President Grover Cleveland ha been detailed in numerous articles,[3,8,13,15,16] and will not be repeated here However, a brief summary will suffice to describe the momentous events which set the historical stage, and will explain their significance and the necessity for secrecy.

Before Cleveland was elected for a second non-consecutive term, near-disastrous economic troubles were unleashed by the passage of the Sherman Silver Purchase Act of 1890.[14] This act required the government to purchase 4.5 million ounces of silver annually. Of necessity notes were printed, fully redeemable in gold, for payment. The net effect was to drive gold out of the country. The unabated production of paper money produced rampant inflation, caused gold reserves to drop precipitously, and resulted in exportation imbalances, bankruptcies, and more than 600 bank failures.[8] Cleveland, battling the tide of Populists and Silverites who desired free and unlimited coinage of silver as a solution, was re-elected on a platform that called for repeal of the Sherman Act and favored conservative fiscal and monetary policies. Although the inauguration of the President occurred in March 1893, steps were not seriously under way to repeal the Act until early summer.

In the midst of all this financial confusion, called the "Panic of '93," President Cleveland noticed a lesion on the roof of his mouth. Remembering that the Vice President, Adlai E. Stevenson, was a "silver man" and opposed to the repeal of the Sherman Act, the President decided that indication of ill health on his part would be seized upon as a sign of weakness.[14] Therefore, after his dentist and the White House physician, Dr. Robert M. O'Reilly, had seen the lesion and had recommended surgical consultations, Cleveland decided to proceed with the utmost secrecy. The family physician, Dr. Joseph D. Bryant of New York, noted for his oral surgery, was asked to examine the President, which he did on June 25.[13] Once the decision was made that the operation was necessary, the various members of the medical team were informed. Since, as is still true today, secrets were impossible to keep in the capital city, the operation would be performed outside Washington. The President suggested use of the yacht *Oneida*, which belonged to a close friend, Commodore Elias C. Benedict, as the operating suite.[13]

The President left Washington at 4:20 P.M. on June 30. Mrs. Cleveland did not accompany him. He travelled by train to New York City, where the yacht awaited him. The surgical team gradually assembled and also boarded there. While the yacht was on its way to the President's summer home (called "Gray Gables") at Buzzards Bay, Massachusetts, the operation was performed. Besieged by reporters upon landing, the party gave no hint as to what had happened. The official word was that the President had a "bad tooth...extracted" and needed rest.[9]

During the summer months, which the President spent at Gray Gables, the

House of Representatives debated the repeal vigorously and at great length, and filibusters were threatened. On August 28 the House voted for repeal. It was not until October 20, nearly a month after the President had returned to Washington, that the Act was likewise repealed by the Senate.[14] The cause of the economic depression was removed and the country gradually recovered.

When Cleveland returned to Washington, no one suspected that anything so momentous had happened to him. His speech was clear and sharp — if anything, improved.[8] Shortly after the repeal was passed by the House, a very detailed and accurate account of the entire operation was published in the August 29 issue of *The Philadelphia Press* under the pen name "Holland." Apparently the dentist, Ferdinand Hasbrouck, had betrayed the secret and had supplied a young reporter, later identified as E. J. Edwards, with all the information.[8] Holland's account was denied vigorously, not only by the White House but by all other participants. For example, Mr. L. Clarke Davis, editor of the *Philadelphia Public Ledger* and a close friend of the President, wrote that Holland's statement "had a real basis of a toothache;"[14] the story thus became discredited. For his part in this breach of secrecy, Dr. Hasbrouck was summarily dispatched his fee of $250.00, and never spoken to again by Dr. Bryant, the captain of the surgical team. The reporter Edwards was not vindicated until 1917, when Dr. W. W. Keen, another participant, recounted the entire incident in *The Saturday Evening Post*.[8]

History of Present Illness

In July 1893, President Grover Cleveland was fifty-six years of age. About two months before, he apparently began to complain of an irregularity or rough spot on the roof of his mouth. According to Dr. William W. Keen, who was to be the chief operating surgeon, the patient

> ...stated that he was sure the rough place was of recent origin; that it was not there on March 4th, when he was inaugurated, but had been first observed about six or eight weeks before July 1st.[9]

However, Allan Nevins, the historian, specifies the date on which Cleveland first noted the abnormality:

> ...yet on May 5, Cleveland noted a rough spot on the roof of his mouth. It gave him increasing discomfort, and on June 18th, he had it examined by the White House physician, Dr. O'Reilly.[14]

Although one author wrote that the lesion was painless,

> While there was no pain associated with it, the "rough place" on the roof of the President's mouth continued to worry him.[13]

others have stated that the lesion was annoying and irritating, and that the President described his mouth as being "afire."[16] Aside from this complaint the President felt well, and none of his biographies mentions major previous illness.

This lesion was treated initially by Dr. R. M. O'Reilly, the White House physician, with iodides and bichloride of mercury.[4] A letter from Dr. O'Reilly to Dr. Bryant dated June 25, 1893 reports that the patient is

> ...taking 120 grains iodide daily, and 3/16 bichloride. He sleeps and eats well. The injections have been made daily, and a portion of the ulcer is pretty well stained. They give him pain at times, but that subsides quickly. I fancy the sore looks a trifle better.[13]

The use of iodides and bichloride of mercury is not to be interpreted as indicative of syphilis; these drugs were prescribed for any number of ailments at that time.[20] In addition, pyoktanin, a methyl-violet dye reputed to have analgesic and anti-infective properties, was injected into the ulcer. These measures appeared to have some beneficial effect upon the palatal lesion, for by June 27, 1893, Dr. O'Reilly is

> ...decidedly of the opinion that there are evidences of healing around the margin.[13]

The patient was taking no other medicines. He occasionally drank whiskey and often smoked cigars. His family history was non-contributory.

Physical Examination

The patient is described as being fifty-six-years of age, and "very corpulent, with a short, thick neck."[9] Examination of the oral cavity on Sunday, June 18, by Dr. R. M. O'Reilly, later Surgeon General of the United States Army, revealed

> ...an ulcer as large as a quarter of a dollar, extending from the molar teeth to within one third of an inch of the middle line, and encroaching slightly on the soft palate, and some diseased bone.[9]

In a letter to Dr. Bryant written on June 19, Dr. O'Reilly elaborated:

> I saw little but that the gum had receded from the first molar, and that there was a sinus opening on the palate. I had the dentist look at it the next day, and he reported to me that it was not caused by the tooth or by tartar....Yesterday morning I saw him, and by a good light. He has an ulcerative surface nearly as large as a quarter, with cauliflower granulations and crater edges, with at least one sinus extending to the bone, which is apparently roughened.[13]

Dr. W. W. Keen, Professor of Surgery at Jefferson Medical College, examined the oral cavity subsequently and found:

> On the left side of the roof of the mouth, there is an ulcer beginning at the second bicuspid tooth, and extending to the posterior edge of the last molar. Transversely, it reaches to within on third of an inch of the middle line. The edges are slightly thickened, and surface covered with a granular erosion, elevated but little above the surface of the mucous membrane of the gum. Posterior to the growth, there is an area of induration extending into the upper part of the soft palate to a slight extent. The growth is very clearly an epithelioma.[9]

The remainder of the physical examination, performed on July 1, 1893, by Dr. Edward G. Janeway, the prominent New York physician, was recorded by Dr. O'Reilly as follows:

> [Dr. Janeway] found the lungs healthy, the respiratory murmur normal, no rales audible, the heart sounds free from any adventitious murmur, the impulse difficult to obtain on account of the amount of precordial fat. The first sound clear, the second sound now intensified, the exact sounds are difficult to determine on account of adipose....He [the President] replies that he puffs a little going up stairs, but that he has not been troubled by an definite shortness of breath when quiet or by exertion.[13]

Concerning Dr. Janeway's examination, Dr. Keen recalled that

> Dr. Janeway made a most careful examination of his chest, and found nothing wrong. There was little if any arteriosclerosis. His pulse was 90. His kidneys were almost entirely normal.[9]

Exactly how the renal examination was performed is not known, but Dr. O'Reilly stated:

> The urinary examinations show beginning chronic nephritis which is not a result of the urea interfering with the renal function, but which is sufficient to make us cautious about the administration of ether for fear of having a possible accident.[13]

Dr. John F. Erdmann, Dr. Bryant's assistant, later stated that Mr. Cleveland's teeth were unusually strong, and that he had a complete set in the upper jaw.

On June 19, 1893, Dr. O'Reilly biopsied the lesion and sent it to the Army Medical Museum. There the pathologist, Dr. William H. Welch, completely ignorant of its unusual origin, examined it and diagnosed it as having "no positive proofs of malignancy...[but a] probable...epithelioma."[13] Despite the lack of a firm diagnosis, Dr. Bryant and the others continued to suspect malignancy. Indeed, when Mr. Cleveland asked Dr. Bryant what course of action should be taken, Dr. Bryant responded,"Were it in my mouth, I would have it removed at once."[8] Apparently there was no further discussion of the matter, and the President, together with his physicians, decided to proceed with the operation.

The First Operation

As already stated, the operation was performed on the yacht *Oneida* en route to Buzzards Bay. Drs. Keen, Bryant, Erdmann, O'Reilly, and Hasbrouck were in attendance. The ship's steward acted as surgical nurse. The patient was seated in the operating chair at 12:31 P.M., July 1, 1893. Nitrous oxide gas was begun at 12:32 P.M., ether at 1:14 P.M. The operation was finished by 1:55 P.M. What can be called an operative note is given by Dr. Keen:

> Dr. Hasbrouck first extracted the two left upper bicuspid teeth under nitrous oxide. Dr. Bryant made the necessary incisions in the roof of the mouth, also under nitrous oxide.
>
> At 1:14 P.M., ether was given by Dr. O'Reilly. During the entire operation, Dr. Janeway kept close watch on the pulse and general condition. Dr. Bryant performed the operation, assisted by myself and Dr. Erdmann.
>
> The entire left upper jaw was removed, from the first bicuspid tooth to just beyond the last molar, and nearly up to the middle line. The floor of the orbit — the cavity containing the eyeball — was not removed, as it had not yet been attacked. A small portion of the soft palate was removed. This extensive operation was decided upon because we found the antrum — the large hollow cavity in the upper jaw — was partly filled by a gelatinous mass, evidently a sarcoma. This diagnosis was later confirmed by Dr. William H. Welch, of the Johns Hopkins Hospital, who has also examined the former specimens.
>
> Only one blood vessel was tied. Pressure, hot water, and at one point, the galvano-cautery, checked the bleeding. The hemorrhage was not large, probably about 6.0 ounces — say, a tumbler-full in all. At the close of the operation, at 1:55 P.M., the pulse was only 80. The large cavity was packed with gauze to arrest subsequent minor oozing of blood. At 2:55 P.M., a hypodermic of 1/6 of a grain of morphine was given — the only narcotic administered at any time.
>
> ...Mr. Cleveland's temperature after the operation was 100.8 degrees Fahrenheit, and never thereafter rose about 100.0 degrees. His pulse was usually 90 or a little over.[8,9]

Important additional details concerning the extent of the lesion can be found in the "Keen Scrapbook:"

> Examination...showed that the disease had begun around the roots of the molar teeth and had extended into the antrum from its floor....on finding the invasion of the antrum it was determined to remove all the jaw except the floor of the orbit and the intermaxillary portion, which were clearly free from invasion.[4]

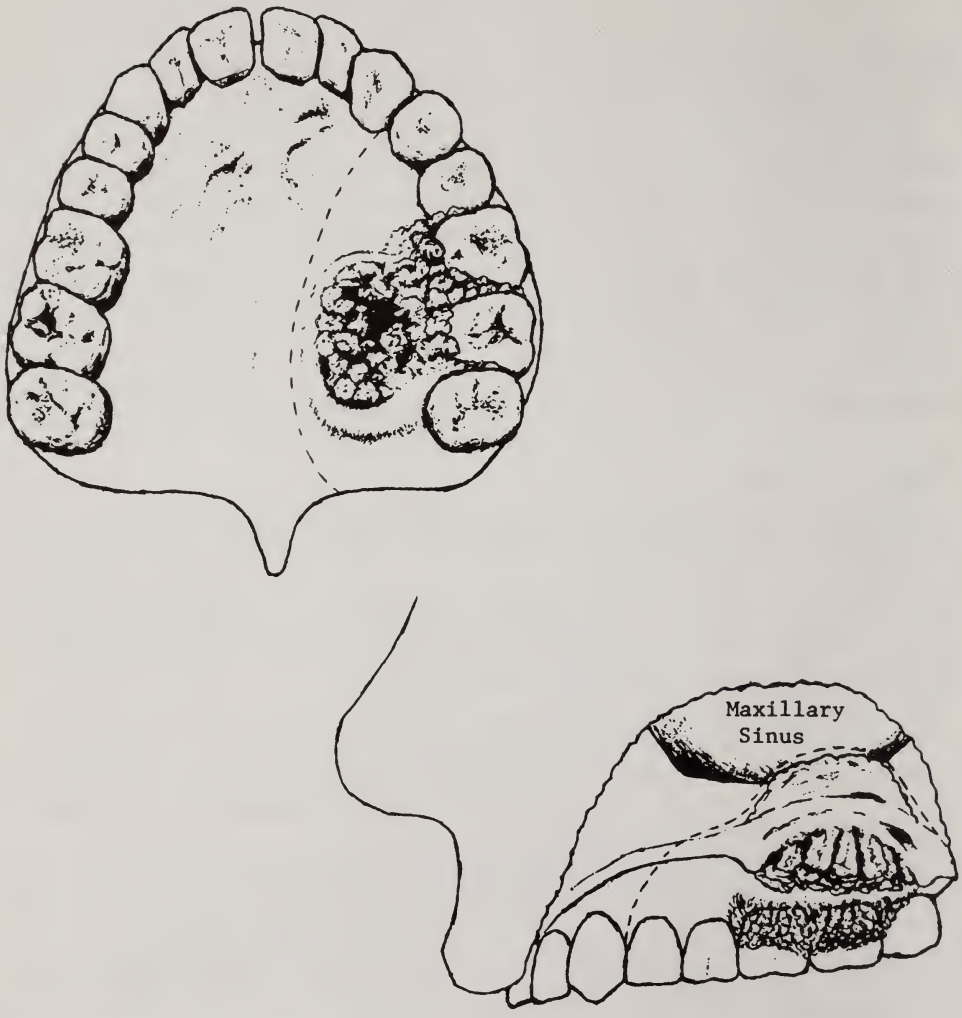

Figure 1. Drawing reconstructing Mr. Cleveland's lesion. The "cauliflower" lesion measured 2 to 3 cm. and bore heaped-up edges. The dotted region corresponds to the tissue excised during the operation.

An artistic reconstruction showing the lesion and the extent of the operation is found in Figure 1.

The President's recovery after the operation was swift. Although he commented to Attorney General Richard Olney, "My God, they nearly killed me!,"[14] he was up and walking around on the night of the 2nd of July, and felt reasonably well the next day. After arriving at Gray Gables, Cleveland recuperated and most of the medical team dispersed. About a week after the first operation Dr. Bryant examined the operative results. Not quite satisfied that all

the diseased tissue had been removed, he quickly requested the team to reassemble aboard the *Oneida.*

The Second Operation

The second operation occurred on July 17, sixteen days after the first. Dr. Keen reports that the doctors

> ...removed all the suspicious tissue and cauterized the entire surface with galvano-cautery. This operation was brief, and the President recovered quickly.[9]

Much later, in 1905, Dr. Bryant stated that the purpose of the second operation was "for the sake of giving the patient the benefit of every doubt."[13]

These two operations produced a defect in the roof of the President's mouth; it measured 2.5 inches by 13/16 inches.[13] Since this caused great difficulty in speech, Dr. Kasson Gibson, a New York dentist, was commissioned to provide a prosthesis.

Followup and Later Illnesses

Apparently the excision caused no subsequent problems. With the vulcanized rubber prosthesis provided by Dr. Gibson, the President's speech was "excellent, even its quality not being altered."[8] By August 30, 1893, Dr. Bryant notes "all healed."[8] The members of Congress noted no great change in the President's voice when he spoke to them on September 5 concerning the silver question.

The only sequela of the operation was an earache which occurred some months after the operation.

The defect continued to heal and shrink remarkably. By 1897, a cast of the palatal defect measured only 11/16 inches by 7/16 inches.[13] The progress of healing can be judged by comparing the cast made in 1893 with that made in 1897 (Figure 2).

The President remained in good health until late in his retirement. As he was approaching the age of 70, his

> ...health was increasingly infirm. He suffered much from rheumatism, and was sometimes in bed for weeks together. Thus, in the winter of 1899-1900, a severe illness lasted for several weeks...his digestion also became increasingly troublesome. After 1900, he kept a stomach pump always at hand, and not infrequently used it.[14]

The nature of this gastrointestinal illness is unknown. Obviously it had been present for at least seven years, until the time of Cleveland's death.

> Near his death, Cleveland was "in the grip of gastrointestinal disease complicated by ailments of the heart and kidneys. Early in the spring, he was prostrated by a painful attack, and went to Lakewood to recuperate."[14]

Possibly the President also suffered from gouty arthritis, for one historian relates that just before his death,

> The country was relieved on June 23rd when a bulletin was issued at his home announcing that he was 'rapidly recovering from an attack of gout and indigestion.' This announcement was made after a visit of Dr. Bryant.[11]

Despite the optimism related in that bulletin, Grover Cleveland died the next morning at 8:40 A.M., on June 24, 1908, fifteen years after his operation. The oral

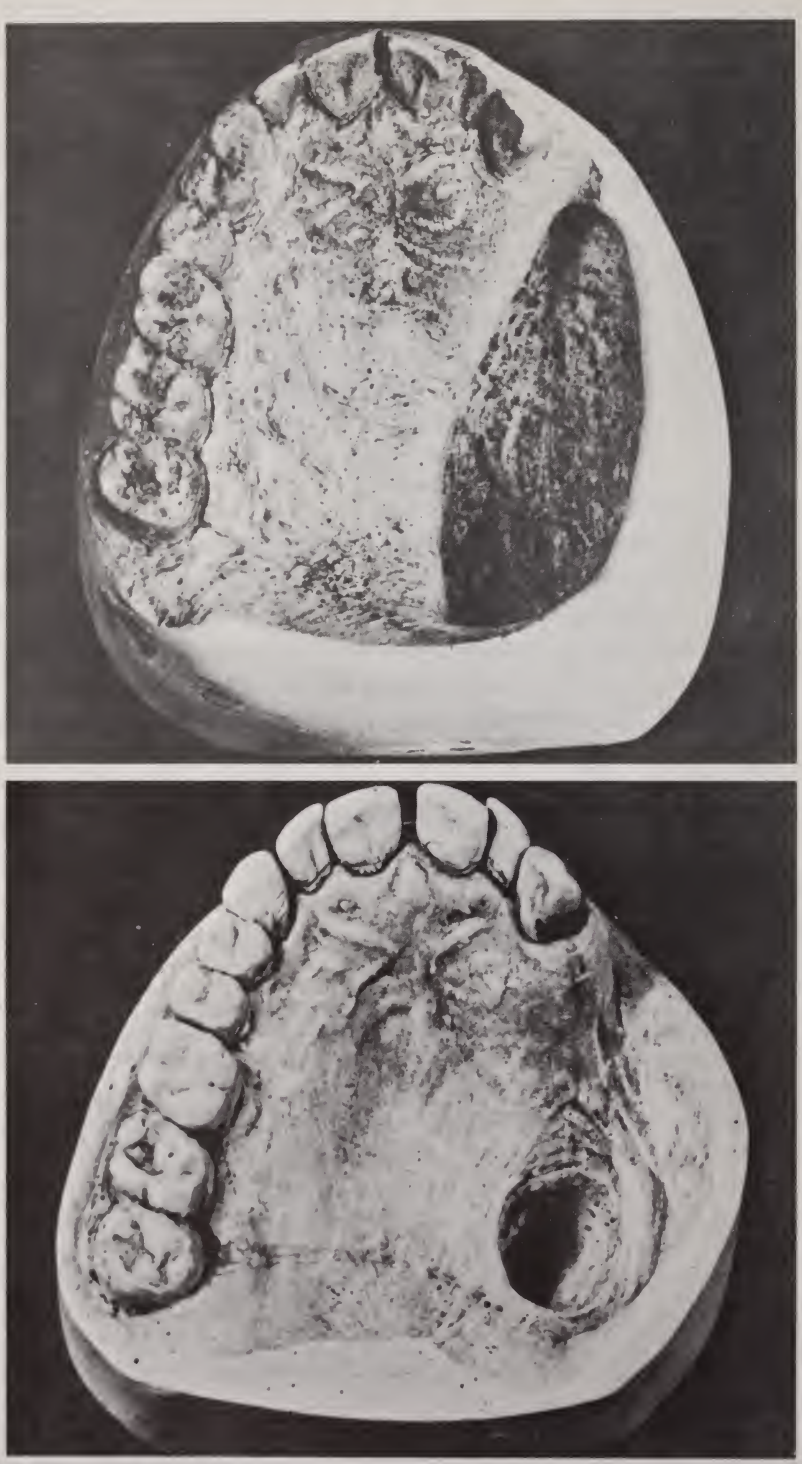

Figure 2. Cleveland's dental casts (photographs). Comparison of the cast on the top (1897) with the cast on the bottom (1893) illustrates notable healing and shrinkage of the palatal defect.

disease had never recurred. According to Dr. Keen:

> That he should have survived after the removal of a sarcoma of the jaw without local recurrence for so unusually long a period was a great satisfaction to Dr. Bryant and his colleagues.[9]

The cause of President Cleveland's death is uncertain. According to one historian his death certificate is

> ...not accurate, listing the causes of death as 'heart failure complicated with pulmonary thrombosis and edema.' Dr. Erdmann stated that Cleveland died of an intestinal obstruction, the cause of which is not determined. He had no further symptoms or difficulty with his antral tumor.[13]

However, the *New York Herald* of June 20, 1907 (p. 3) stated that the President had been perilously ill with internal trouble, and the diagnosis was said to be a malignant internal growth. Dr. Erdmann, in an interview held on September 13, 1916, stated that

> A postmortem examination was made by Graham Lusk [William C. Lusk, not Graham], and that extensive carcinoma was found in the intestines.[4]

Original Pathologic Diagnoses

At least one biopsy specimen was taken from the President's oral lesion by Dr. Robert M. O'Reilly, at some time between June 13 and June 19, 1893. Dr. O'Reilly personally brought the tissues to an unnamed pathologist at the Army Medical Museum in Washington, D.C. In a letter to Dr. Bryant dated June 19, 1893, Dr. O'Reilly, writing from the Army Medical Museum, states that the pathologist

> ...reports while there are no positive proofs of malignancy, there are certain indications which make it probable that the specimens are from a case of epithelioma.[13]

Dr. William Welch at Johns Hopkins Hospital also examined the biopsy material.[9] It is possible that other biopsies were made on other occasions. This can be inferred from Dr. Bryant's recollections, which state that when he examined the President on June 25 with Dr. O'Reilly

> ...a small piece of growth was then removed for microscopic examination, after which the final removal of the disease, and the time and place of the operative procedure, were discussed.[13]

Whether the resection specimen was examined microscopically is unknown; very probably this was done. Dr. Keen stated that after the operation the diagnosis of sarcoma was, "later confirmed by Dr. William H. Welch of the Johns Hopkins Hospital, who had also examined the former specimen."[9] Other pathologists also examined the lesion in one of its forms, since in a letter to Dr. Keen, Dr. Erdmann states:

> The tissue removed from the late President's jaw was examined by Dr. Herman M. Briggs and Dr. D. H. McAlpern, and Dr. Welch, all at about the same time, furthermore, I am sure that the tissues or slides were sent to Dr. McAlpern and to Dr. Biggs under an assumed name. The reports given to me verbally by Dr. Bryant were carcinoma.[13]

Although several pathologists reviewed the material, there is no record of any reports rendered by the Army Medical Museum (now the Armed Forces Institute of Pathology), or by Johns Hopkins Hospital.

A list of all the original diagnoses made by the participants is given in the Table. It should be noted, first of all, that "epithelioma" at that time was considered the same as "carcinoma." Thus there appears to be general agreement among the four doctors who were present at the operation. The disagreement and confusion result from Dr. Keen, who stated that the lesion in the maxillary antrum, was extremely myxomatous, and dubbed it "a sarcoma:"

> The growth into the antrum was a gelatinous mass, apparently a myxosarcoma, and totally different in appearance from the typical epithelioma of the floor of the mouth.[13]

Dr. Erdmann, in response to this statement, made by Dr. Keen in 1917, later stated that, "Actually, it was a carcinoma."[14] Still later, another pathologist who reviewed the original material remembered the lesion as "an ameloblastoma" and "not malignant."[4]

TABLE. DIAGNOSES of PRESIDENT CLEVELAND'S ORAL LESION

A. By principals:

William W. Keen, M.D.	sarcoma epithelioma
Joseph D. Bryant, M.D.	epithelial cancer
Robert M. O'Reilly, M.D.	epithelioma
John F. Erdmann, M.D.	carcinoma

B. Subsequent speculations by other physicians:

not malignant
ameloblastoma
osteosarcoma
mixed tumor,
accessory gland
gumma
carcinoma
sarcoma
epulis
granuloma
syphilis
benign mixed tumor

Thus, confusion as to the pathologic diagnosis began with the principals involved and has continued to this day. For example, doubt was raised in the mind of Dr. Morreels:

> If this tumor was a malignant neoplasm as opposed to an inflammatory lesion, President Cleveland experienced a significant tumor-free survival. It is true that this lesion arose in a location where it was detected relatively early, and where wide excision was accomplished without sacrificing vital structures.[13]

Dr. Morreels referred to the tumor-free survival as "significant"since the absence of recurrent or metastatic disease is distinctly unusual in ordinary oral cancer (squamous cell carcinoma).[2,19] Many physicians entertained the possibility that the tumor was not the typical oral cancer but perhaps some other type of slow-growing benign tumor. For example, Dr. William M. Shelley of Johns Hopkins Hospital stated that:

> By reading between the lines, I am beginning to suspect that the tumor probably was an accessory gland tumor of some sort, perhaps a mixed tumor.[4]

Even the neoplastic nature of the lesion has been questioned and the possibility of gumma,[4] the inflammatory lesion of tertiary syphilis, was mentioned. The fact that the lesion was said to have healed somewhat preoperatively further complicates the issue and lends credence to such interpretations. Since Cleveland's death, then, there has been much speculation by pathologists as to the true nature of the lesion. The diagnoses suggested are listed in the Table.

These lingering doubts have led several pathologists to request the opportunity to review and perhaps improve the diagnosis. Probably considerations of delicacy prompted the denial of these requests by the Mütter Museum of the College of Physicians of Philadelphia where the tissue had been deposited. After the death of the President's last living immediate relative, his son Richard, specimens were finally obtained by Drs. Aponte and Enterline.

Gross Description

Undoubtedly the tissue removed during the original resection was subjected to pathologic study. However, like the biopsy material discussed above, the original sections and the corresponding paraffin blocks of this material have been lost. What remained of the specimen was donated to the Mütter Museum of the College of Physicians of Philadelphia by Dr. Kasson C. Gibson through Dr. William Keen on October 5, 1917. The tissue had been kept over the years in a small round pharmacy-like jar with a glass stopper. Although the identity of the original fixative is unknown, the specimen was in an alcohol-based fluid when we viewed it.

In 1976, these pieces were examined for the first time in more than eighty years (H.T.E.). Each fragment was separately labelled, photographed, and X-rayed (Figures 3, 4). After an initial detailed gross description, appropriate specimens were taken for microscopic examination. The authors were permitted

Figure 3. Tissue with assigned letters, as found in 1976 (see text for description).

Figure 4. Maxillary bone with molar teeth. Note the numerous wart-like growths on the gingival surface.

to examine the specimen with the provision that only minimal damage to it would result; therefore, only small selected fragments were subjected to histologic study. Later, in order to resolve questions relating to the extent of the lesion, the tissue was re-examined and two additional portions were removed (J.J.B.). What follows is a detailed description of the fragments of originally resected tissue and their probable anatomic positions, as well as a summary of the locations from which material was taken for pathologic review.

Specimen A: Measuring 1.8 x 0.2 cm., this irregular piece was soft and membranous. Since no definite lesion was detected, no tissue from this specimen was submitted for study. Its site of origin remains undetermined but it is thought to be part of the soft palate.

Specimen B: Consisting of what appeared to be muscle covered in part by a membranous surface, this specimen measured 1.7 x 1.0 x 0.3 cm. Presumably it came from the inner aspect of the left superior buccal mucosa and underlying muscle near the parotid gland. No portion was submitted for examination.

Specimen C: This soft fragment measured 1.3 x 0.6 x 0.4 cm. Within it a slightly yellowish nodule, 0.4 cm. in greatest dimension, was noted, partly enveloped in a membranous structure. The origin of this fragment can only be conjectured. Perhaps it was a portion of "gum" with overlying gingival mucosa. Histologic study was not performed on this specimen.

Specimen D: A small shallow shaving of bone with no attached soft tissue constituted this specimen. Its dimensions were 2.0 cm. in length, 1.0 cm. in width, and 0.2 cm. in depth. Because of its size, it is thought that this represents a sliver removed from the maxillary bone. As no defects were observed, this specimen was not examined histologically.

Specimen E: This fragment consisted of a piece of bone with small amounts of adherent soft tissue, irregular in shape and measuring 3.3 x 2.5 x 1.3 cm. Some attached muscle was noted. While this tissue was not subjected to histologic examination, it is surmised on X-ray evidence to represent maxillary and palatal bone and soft tissue.

Specimen F: Measuring 2.7 x 2.0 x 1.0 cm., this piece was firm and irregular. Mucous membrane lined one surface, muscle being apparent underneath. The bulk of the specimen was composed of a light-brown tissue. Without question, this specimen contains a bit of the left parotid gland covered by buccal mucosa. This assignment was confirmed by histological examination (see below).

Specimen G: This was a bicuspid tooth with a single root, and measured 2.4 x 0.6 x 0.7 cm. A single gold filling was present. Its configuration showed this tooth to be the left upper second pre-molar.

Specimen H: This was another bicuspid tooth, this time with two roots. Measuring 2.6 x 0.8 x 0.5 cm., it contained no fillings, and was recognized as the left upper first premolar.

Specimen I: The posterior left maxilla, together with the first, second, and third molar teeth comprised this specimen (see Figures 4 and 5). Part of its superior surface represents a portion of the floor of the maxillary sinus. In toto, the specimen measured 4.5 x 3.0 x 2.0 cm. The bone of the maxillary sinus appeared to be fractured.

The lateral surface of the bone was covered by smooth gingival mucosa, to which was attached a small bit of skeletal muscle. On its medial aspect the mucosa presented a different appearance. Here, along the border between the gingiva and the molar teeth, wart-like excrescences were noted to protrude to 1.0 cm. above the mucosal surface. These were particularly prominent in the regions between the first and second molars, and again between the second and third molars. As they extend into the intermolar gingiva, these verruciform growths can be seen to separate the teeth somewhat. It was difficult to determine whether the roots of the molars were also involved. Similar irregular-appearing soft tissue was noted in the posterior two-thirds of the superior aspect of the specimen, corresponding to the region near the floor of the maxillary sinus.

Some areas of the crown and outer surface of the teeth were encrusted with yellowish plaque. One molar tooth contained a gold filling. Most posteriorly, an empty socket previously

occupied by a wisdom tooth was seen, but no tumor was found.

Sections of this specimen were submitted for histological examination from 1) tissue between the first and second molars (BMA); 2) tissue from between the second and third molars (BMB); and 3) tissue from the superior aspect of the maxillary bone near the sinus (USM).

Specimen J: This roughly triangular fragment measured 3.5 x 1.3 x 2.0 cm. and constituted what remained of the ulcerative lesion of the hard palate. One surface displayed a crescentic lesion with heaped-up borders surrounded in some areas by apparently normal mucosa (Figure 6). In the center of the lesion, firm, rubbery, warty masses alternated with foci of ulceration. These masses appeared grossly to extend beneath the normal mucosa.

The other (superior) surface, thought to represent the floor of the maxillary sinus, consisted of a small piece of worrisome soft tissue from the sinus mucosa and a triangular portion of bone representing the hard palate. An X-ray of the bone revealed no evidence of actual destruction or bony reaction; however, centrally the osseous tissue was more lucent and somewhat suspicious.

Subjected to histologic examination were: 1) portions of the warty palatal growths and underlying tissue (J); 2) sections of the anterior (ALR) and posterior (I) lines of palatal resection; 3) soft tissue representing the floor of the maxillary sinus (FMS); and finally a fragment of the palatal bone (PB) residing between the oval lesion and the soft tissue of the maxillary sinus.

Figure 5. Roentgenogram of the specimen depicted in Figure 4 (specimen I). No erosion of the bone at the roots of the molar teeth can be seen.

Figure 6. The principal ulcerous lesion on the hard palate (specimen J). The mucosal outline is crescentic. Many finger-like excrescences project upward.

Microscopical Description

Nine fragments of tissue were examined microscopically. Each of these was stained with hematoxylin and eosin, periodic acid-Schiff (PAS) before and after diastase, mucicarmine, Brown-Brenn Gram stain, Grocott, methenamine silver, Warthin-Starry modification of the Dieterle stain, Gridley stain, and Fite stain for acid-fast bacilli.

For the most part the tissue stained weakly with hematoxylin and eosin, a fact attributed to its age and prolonged fixation. Sections stained with PAS displayed the microscopic structure quite well. Slides stained with special microbial stains, carefully examined, failed to reveal bacteria, viral particles, tubercle bacilli, spirochetes or fungi.

Histologically, sections labelled "F" from the specimen labelled "F" confirmed the gross impression of salivary gland tissue. One surface was lined by non-keratinizing squamous epithelium showing only focal acanthosis. Skeletal muscle and fibrous connective tissue were seen in the underlying soft tissue. The remainder of the tissue was salivary gland, with predominance of serous acini. Though for the most part these sections were unremarkable histologically, focal atropic acini were surrounded by lymphocytes and plasma cells (Figure 7). One salivary duct displayed squamous metaplasia.

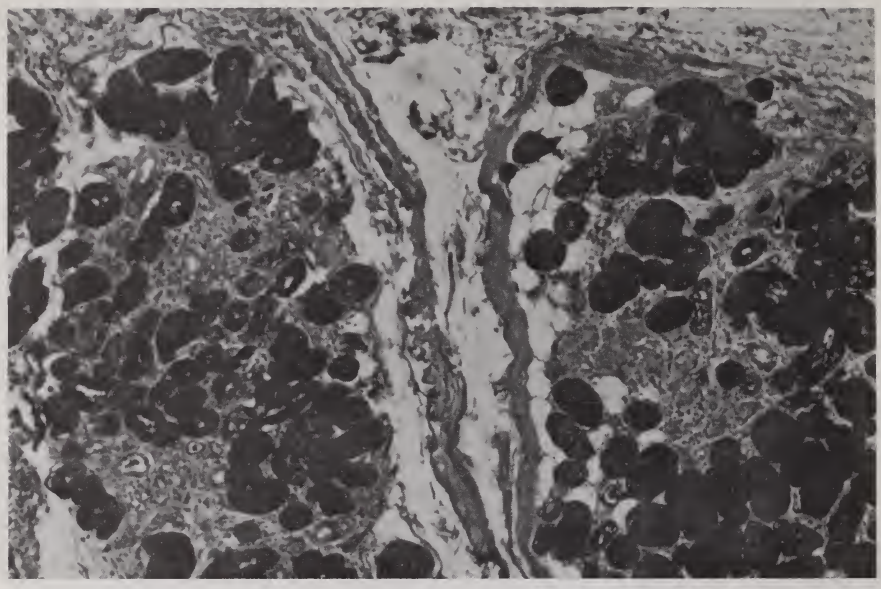

Figure 7. Photomicrograph of salivary gland in specimen F. The dark salivary acini are absent in three areas which are infiltrated by lymphocytes and plasma cells. This is chronic sialadenitis. (PAS, X20)

Figure 8. Photomicrograph of palatal mucosa adjacent to tumor in specimen J. In contrast to normal mucosa, it is thickened (acanthotic) and inflamed. (PAS, X100)

The main lesion was best seen on sections labelled "J" from the lesion of the palate. At one end of the section, a mucosal lining of squamous epithelium showed mild acanthosis, elongation of epithelial pegs, and a mild chronic inflammatory infiltrate of lymphocytes and plasma cells in the submucosa (Figure 8). On the mucosal surface this acanthotic squamous mucosa was replaced abruptly by sheets of epithelial cells, which projected above the surface of the mucosa in papillary fronds (Figure 9) corresponding to the wart-like growths apparent grossly. In the submucosa, elongated finger-like nests of infiltrating epithelial cells with occasional central necrosis were noted. These club-shaped epithelial sheets could be seen to infiltrate the tissue to a depth of approximately 8.0 to 9.0 mm., particularly within the fibrous septa of minor salivary gland tissue (Figure 10). Indeed, certain lobules of these glands appeared nearly surrounded by tumor, which could also be seen to extend extremely close to large nerve bundles and vascular structures. Superficial ulceration of the tumor was seen.

The cells composing the papillary fronds and the infiltrating nests were composed of stratified squamous epithelial cells with well-differentiated cell borders and intercellular bridges. Many well-formed squamous pearls were present; some of these lacked nuclei (Figure 11). Prominent hyperkeratosis and parakeratosis were evident on the papillary surface. While the nuclei displayed hyperchromatism, only minimal nuclear pleomorphism was noted (Figure 12), especially at or near the surface. Mild variation in nuclear size and shape was observed in the deeper infiltrating areas. No evidence of glandular differentiation was seen.

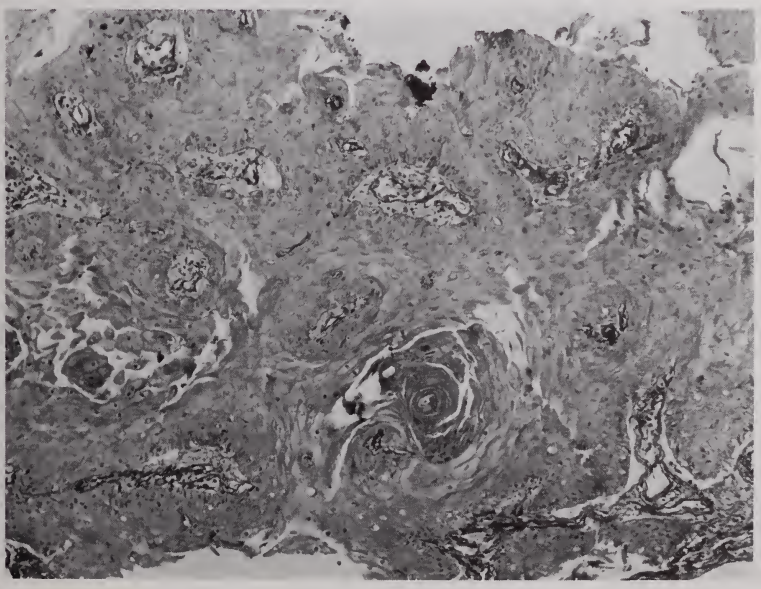

Figure 9. Photomicrograph of surface growths, specimen J. Although cut parallel to the mucosal surface, papillary fronds are seen, with extensive parakeratosis and hyperkeratosis. (PAS, X100)

Similar well-differentiated squamous epithelial cells growing in papillary formation comprised the verrucous gingival growths between the molar teeth (sections BMA, BMB). Again, the nuclear morphology was bland.

The tumor was everywhere accompanied by a dense inflammatory reaction of lymphocytes and plasma cells, so much so that in some areas, no sharp distinction could be made between tumor and stroma. No abnormal or neoplastic stromal cells were demonstrated, nor was any evidence of individual cell invasion detected.

The margins of the neoplasm did not extend to the "deep" margin of resection, which here would be the palatal bone. Sections labelled PB revealed only a dense fibrous and inflammatory infiltrate encroaching upon the bone immediately above the tumor.

The tumor ended 2.0 to 3.0 mm. short of the palatal bone, at least in the tissue examined. Anteriorly, the section of this margin (ALR, vertical to the line of resection) revealed the tumor to be extending to within approximately 2.0 mm. of the line of resection. Here again the uninvolved mucosal surface was nonetheless inflamed and acanthotic. Examination of the section from the posterior margin (I) disclosed only acanthosis and parakerotosis; no tumor was seen.

It was surprising to find epithelial cells in nests and papillary folds in the tissue labelled USM from the superior surface of the maxillary bony resection; this may have represented tumor near the roots of the molars medially. However, a more satisfying explanation, in view of the subsequent course, is that this finding was

Figure 10. Photomicrograph of submucosal soft tissue, specimen J. Note elongated and somewhat cystic tumor nests surrounding dark salivary gland (upper middle) and invading close to neurovascular bundle (right). (PAS, X10)

artifactual; displacement of the nearby gingival fronds of tissue by only 5.0 mm. could have occurred during handling of this specimen over the years. Therefore, we consider it improbable that the surgeons cut across tumor in this location.

Sections taken from the soft tissue of the floor of the maxillary sinus (FMS) were lined on one surface by respiratory epithelium (Figure 13). Beneath the mucosa, extensive interstitial edema and a marked perivascular and interstitial inflammatory infiltrate were found. Numerous plasma cells and lymphocytes together with occasional neutrophils in a vascular stroma constituted the infiltrate. Focal mucosal ulceration was observed but no tumor was found.

Interpretation

Despite the conjecture mentioned above, there was no evidence that the lesion was a carcinosarcoma, mixed tumor, or chancre, nor was there anything to support Dr. Keen's interpretation of myxosarcoma. The present authors are convinced that this neoplastic lesion is best termed a *verrucous carcinoma* of the hard palate and gingiva, and, further, that this interpretation helps to explain all the pertinent facts.

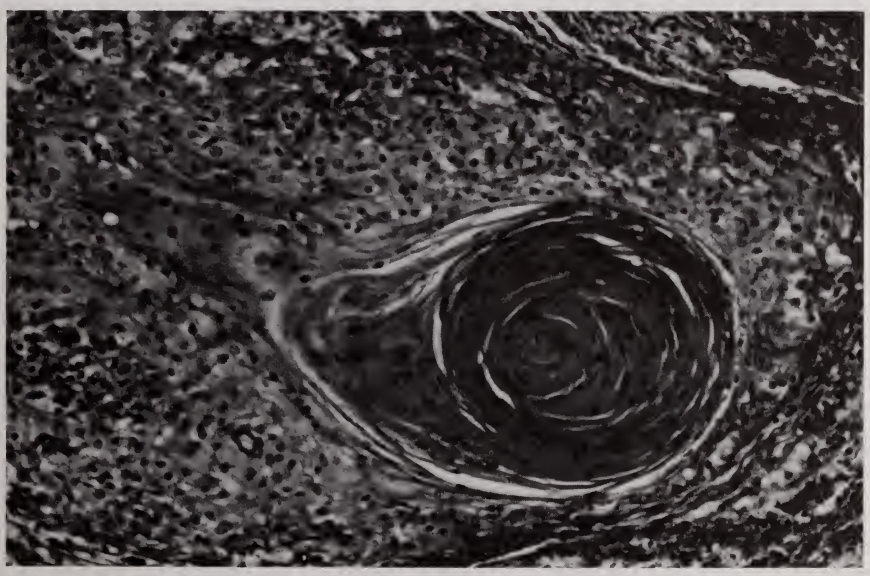

Figure 11. Photomicrograph of tumor. This large squamous pearl is situated in an invading tongue of tumor, which has elicited a marked inflammatory response. (PAS, X300)

This neoplasm satisfies all the criteria of verrucous carcinoma originally outlined by Ackerman.[1] He differentiated verrucous carcinoma from well-differentiated squamous cell carcinoma by finding in the former prominent keratin production with numerous pearls, minimal nuclear pleomorphism, blunt infiltration by club-shaped extensions, and a prominent inflammatory infiltrate. All these features were demonstrated in Cleveland's neoplasm. In addition there

were no microscopic findings incompatible with this diagnosis, i.e., no single-cell invasion or undifferentiated areas could be identified. The lesion was excised completely, and did not involve the suspicious-appearing palatal bone. Our other diagnoses include hyperkeratosis and parakeratosis of oral mucosa ("leukoplakia"), mild chronic sialadenitis, caries, and dental plaque.

Verrucous carcinoma accounts for two to four per cent of all oral carcinomas.[10, 19]. More than 75 per cent of the cases are found in men,[17] and the average age at diagnosis is 66. As in other oral cancers, there is a clear association with chewing tobacco, snuff, alcohol, and poor dentition.[6,7] Although it can occur elsewhere in the body, e.g., in the larynx and cervix,[10] verrucous carcinoma is most commonly found in the oral cavity.[19] Characteristically, the tumor presents as a painless sore, present perhaps for years, which suddenly appears to grow more rapidly, and in a few months produces a cauliflower-like lesion;[10] exactly the same description was given by Dr. O'Reilly. As in the present case, many of these tumors are 2 to 5 cm. in size.[10] While the most common oral location is the mandibular sulcus,[19] some tumors arise on the alveolar ridge or hard palate.[10 17] That the lesion is malignant is evident from its rare ability to metastasize to lymph nodes and to invade bone locally;[10] nonetheless, verrucous carcinoma has a low biologic potential.[5] Nowadays, surgical operation is often used as the sole method of treatment;[5, 17] occasionally radiation therapy is added.

Recurrence of the tumor, found in about fifteen per cent of cases, is often due to the development of a second multicentric lesion.[10] The prognosis is excellent — almost all patients survive for five years,[10] compared to less than 50 per cent for standard squamous cell carcinomas.[19]

In summary, verrucous carcinoma is a well-defined clinicopathologic entity, clearly distinguished from the more common squamous carcinoma of the oral cavity.

Discussion

Confident of our diagnosis of verrucous carcinoma, we shall now attempt to explain certain clinical and pathologic aspects of the case.

First, from the clinical standpoint, verrucous carcinomas of the oral cavity can often be found not uncommonly on the hard palate and gingival mucosa, as already stated. Second, they are often asymptomatic for long periods prior to treatment; this explains why Mr. Cleveland noticed the lesion only eight weeks before the operation. Third, it is the late ulceration and resultant irritation of the lesion which draws the patient to the physician, as described in this case. Fourth, the verrucous appearance of the lesion led Dr. O'Reilly to use the word "cauliflower" in describing it. Fifth, the lack of cervical adenopathy at presentation is not surprising in view of the extremely low metastatic potential of the neoplasm. Lastly, complete surgical excision alone is often curative; this is a point of contrast with the standard oral squamous cell carcinoma. As far as we can determine, the lesion was excised completely — a tribute to surgeons who lacked

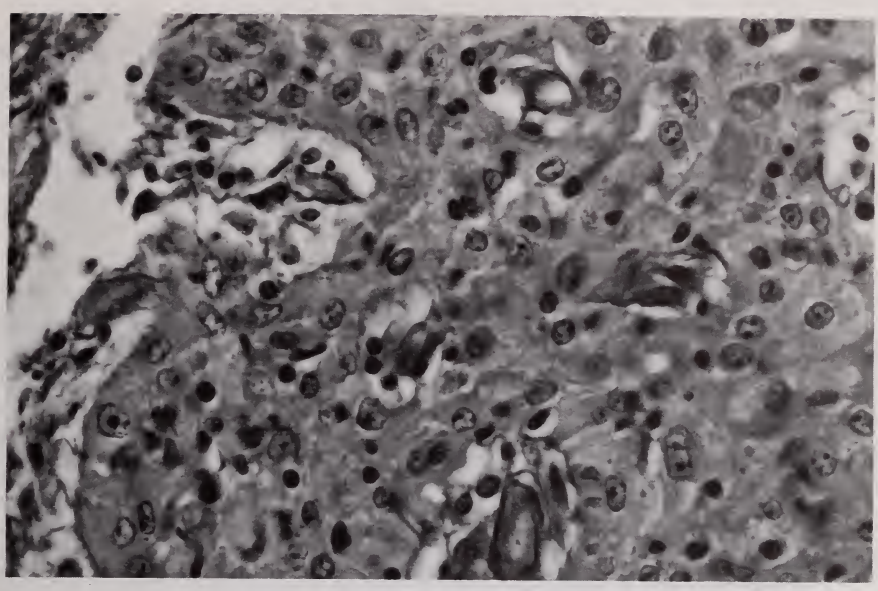

Figure 12. Photomicrograph of tumor. Even the deeper extensions of the invading tumor show only minimal nuclear pleomorphism. (PAS, X500)

the modern frozen-section technique. Thus, President Cleveland lived free from recurrence for fifteen years.

In addition, certain pathologic problems in the case are elucidated by the fact that the lesion was verrucous carcinoma. While Dr. Keen had called the maxillary sinus tissue "myxosarcoma" because of its soft flesh-like "gelatinous" character, we now attribute this to florid edema and inflammatory reaction secondary to the carcinoma. Probably the entire mucosal surface at the bottom of the maxillary sinus appeared to be thrown up into watery nodular elevations, and this led to Dr. Keen's misinterpretation.

It is now well recognized that underdiagnosis of verrucous carcinoma occurs,[19] especially when biopsies have been done superficially. The hesitation of the pathologist, Dr. Welch, to call Cleveland's tumor an outright malignancy thus becomes easy to understand. Undoubtedly Dr. Welch had received only a small superficial portion of the tumor, in which invasion could not be detected.

Because President Cleveland lived for many years and had no recurrence, later physicians and pathologists alike inferred that the resected lesion might not have been the ordinary oral carcinoma. Thus began the numerous speculations as to the true diagnosis. Suggestions ranged from inflammatory lesions such as syphilitic gumma to benign neoplasms such as mixed tumor of the salivary

glands. The verrucous nature of the neoplasm explains the lack of recurrence or metastasis.

Finally, the etiology of the lesion can now be stated. It is well known nowadays that squamous cell carcinomas of the mouth and verrucous carcinomas in particular are often associated with the use of tobacco and alcohol,[6,19] both of which were used by President Cleveland. Many passages in Cleveland's biographies document this fact. For instance, Nevins writes:

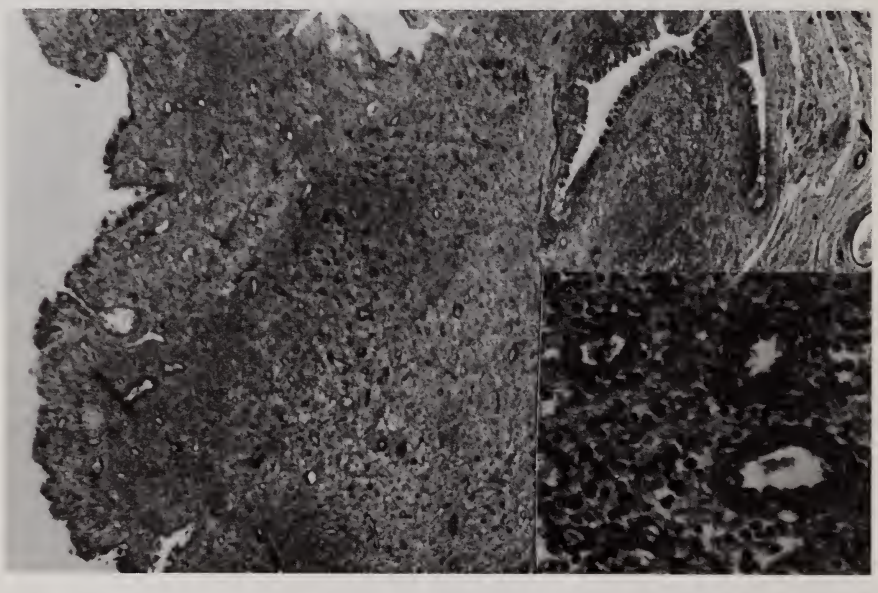

Figure 13. Photomicrograph of soft tissue from the floor of the maxillary sinus. While no tumor can be seen, marked inflammation and granulation tissue are apparent. (PAS, X20) Inset: Perivascular lymphocyte cells. (PAS, X300)

> He was happiest in a hotel lodge; in a friend's room full of tobacco smoke, glasses, and cards...[14]

and again:

> ...Cleveland...was a sparing eater, but he appreciated a well-cooked dinner of the German type...Spirits he drank occasionally, but beer constantly.[14]

The former President was far from being a teetotaller, although he certainly was not an abuser of alcohol. Nevins relates a humorous incident:

> Cleveland returned from Exposition Park through a sea of mud, and in a driving rain. He was to be entertained that evening at the home of Senator Colquitt, who had been a Methodist minister and was one of the pioneer prohibitionists of the South. Cleveland was cold and wet when he arrived. His first words after shaking hands...were, 'Senator, I must have a drink right away.' The astounded Colquitt was...nonplussed. He said 'There hadn't been a drop of liquor in the house since I lived in it,' but a neighbor across the street supplied some bourbon, and in a moment the President had the only drink that Colquitt ever served in his life.[14]

D.T. Lynch adds another detail:

> One of the beer gardens sold a cigar that Cleveland like above all others...he smoked the entire lot. They all tasted as they had never tasted in the beer garden.[11]

On the night before the operation the President indulged:

> On arriving on the yacht, the President lighted a cigar, and we sat down on the deck, smoking and chatting until near midnight.[8]

This led Bennett to make the statement that:

> Cleveland smoked cigars heavily, a practice which may have caused his condition.[3]

Summary

Up to now, all accounts of the diagnosis of President Cleveland's disease have been based on hearsay. Although many serious questions concerning the nature of the lesion have been raised in the last 80 years, we believe they are resolved by our diagnosis of verrucous carcinoma, a low-grade malignant tumor known to behave more mildly than the ordinary oral cancer. The symptoms, clinical presentation, medical diagnoses, and lack of recurrence can all be explained on this basis.

The possibility that the former President died of cancer is not eliminated. As yet, we have been unable to find either the tissues obtained at autopsy or the autopsy report. The long post-operative survival — 15 years — and the known biological behavior of the oral neoplasm make it improbable that the latter was the source of Mr. Cleveland's terminal gastrointestinal symptoms. The character of the original tumor and the skill and aggressiveness of the surgeons combine to explain the successful outcome of the primary illness.

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REFERENCES

1. L. Ackerman, "Verrucous Carcinoma of the Oral Cavity," *Surgery* 23(1948):670-678.

2. K. Arthur and H. Farr, "Prognostic Significance of Histologic Grade in Epithelioid Carcinoma of the Mouth and Pharynx," *Am. J. Surg.* 124(1972):489-500.

3. A. E. Bennett, "The Secret Surgical Operation on President Cleveland," *The Pharos* 38(October 1975):159-160.

4. Correspondence Concerning Grover Cleveland (including W. W. Keen Scrapbook) are in the Historical Collections of the College of Physicians of Philadelphia.

5. E. Fonts, R. Greenlaw, B. Rush, and S. Rovin, "Verrucous Squamous Cell Carcinoma of the Oral Cavity," *Cancer* 23(1969):152-160.

6. S. Graham, H. Dayal, T. Rohrer, M. Squanson, A. Sulte, D. Shedd and S. Fischman, "Dentition, Diet, Tobacco, and Alcohol in the Epidemiology of Oral Cancer," *J. Natl. Cancer Inst.* 59(1977):1611-1618.

7. B. Harrison, "Tumors of the Oral Cavity and Pharynx," *Armed Forces Institute of Pathology, Fascicle 10b, Series I,* (Washington, D.C., 1968):108-118.

8. W. W. Keen, "The Surgical Operations on President Cleveland in 1893," *Saturday Evening Post,* (Sept. 22, 1917):24-25;53;55.

9. W. W. Keen, *The Surgical Operations on President Cleveland in 1893* (Philadelphia: G. W. Jacobs and Co., 1917).

10. F. Kraus and C. Peres-Mesa, "Verrucous Carcinoma. Clinical and Pathologic Study of 105 Cases Involving Oral Cavity, Larynx, and Genitalia," *Cancer* 19(1966):26-38.

11. D. T. Lynch, *Grover Cleveland. A Man Foursquare* (New York: Horace Liverwright, Inc., 1932).

12. A. Mashberg and H. Meyers, "Anatomical Site and Size of 222 Early Asymptomatic Oral Squamous Cell Carcinomas," *Cancer* 37(1976):2149-2157.

13. C. L. Morreels, "New Historical Information on the Cleveland Operations," *Surgery* 62(1967):542-551.

14. A. Nevins, *Grover Cleveland. A Study in Courage* (New York: Dodd, Mead and Co., 1934).

15. L. Rosenhouse, "White House Doctor," *Private Practice* (September 1972):57-64.

16. L. Rosenhouse, "President Cleveland's Secret Surgery," *Private Practice* (October 1974):43-47.

17. W. Shafer, M. Hine and B. Levy, *A Textbook of Oral Pathology,* 3rd ed., (Philadelphia: W.B. Saunders Co., 1974):122-123.

18. M. Shear, D. Hawkins and H. Farr, "The Prediction of Lymph Node Metastases from Oral Squamous Carcinoma," *Cancer* 37(1976):1901-1907.

19. C. Waldron, "Oral Epithelial Tumors," (Chapter 19) in R. Gorlin and H. Goldman, eds., *Thoma's Oral Pathology,* 6th ed. (St. Louis: C.V. Mosby, 1970):837-858.

20. *United States of America Dispensatory,* 17th ed., G. Wood and F. Bache, eds. (Philadelphia: J.B. Lippincott, 1894).

The Development of Procedures in Clinical Neurology

D. DENNY-BROWN

THE general title of this series of lectures, "Toolmakers to Physicians," suggests mechanical facilities appended to clinical examination. I beg to be allowed a little poetic license to speak of the development of the multitude of procedures accessory to the usual clinical examination, and of certain difficulties that arise from an initial over enthusiasm in their application. The topic was suggested by the performance of an unwarranted carotid endarterectomy for unsymptomatic bruit in a friend of the author.

Neurology attained an independent status only after a long apprenticeship, first to internal medicine, and later to psychiatry, and in some places to neurosurgery. The first attempts to view neurological disorders objectively began well over 150 years ago with the realization of Marshall Hall and later of Romberg that the study of reflexes could yield information of value to clinical diagnosis of human neurological illness. It is now extraordinary to realize that the reason that Parkinson failed to describe rigidity in the syndrome that bears his name was that in his day physicians did not regularly attempt physical examination. After some 50 years, Charcot, and in due course Babinski elaborated specific tests based on reflex neurophysiological activity. As with all new clinical methods such reflex tests were first over elaborated. There evolved a "Gallup Poll" type of approach to neurological problems, by trying to reach a consensus of Babinski's, Chaddock, Oppenheim, Rossolimo, and other signs, and a host of cerebellar and vestibular tests. These gradually gave way to a careful assessment of four or five well tried clinical reflex responses elicited by standard methods.

It was 20 years after the invention of the ophthalmoscope by Helmholtz in 1851 that Hughlings Jackson and Leber, and later Allbutt and Gowers showed the importance of the ophthalmoscope in neurological medicine. Yet it was astonishing to the writer to find in the early 1930s that quite distinguished German and French neurologists were not themselves familiar with the use of the ophthalmoscope, being accustomed to refer their patients to an ophthalmologist if they considered such an examination necessary.

For a great many years precision in neurological diagnosis was attained chiefly by careful study of the evolution of symptoms in relation to past experience of

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morbid anatomy. Though Quincke described lumbar puncture in 1895, it was not until 1911 that Mestrezat, Cotton, Ayer, and others began the studies that gave exact information regarding inflammation in the nervous system. Merritt and Fremont-Smith published the first reliable statistical standards for the various constituents of spinal fluid only in 1937. It is extraordinary that the prolonged and intensive studies of cerebrospinal fluid globulins for the Lange and similar tests used in diagnosis of neurosyphilis have now vanished, together with the Swift-Ellis, spinal drainage, and similar attempts to influence supposed immunological reactions in the nervous system.

Though X-rays had been used in medicine since their introduction by Roentgen in 1895, their use for localization of spinal and cerebral disease also did not begin for many years. Detailed studies of the base of the skull, for example, began to appear in 1912, of spinal pedicles and discs not until 1925.

I began a residency in neurology in London in 1928 after a three year graduate fellowship in neurophysiology. Though the challenge of clinical neurology was fascinating, the difficulties in devising methods for physiological investigation of nervous function in man were extremely frustrating. The advent of the Matthews oscillograph at last enabled reliable electromyograms by 1930. We were then able to record fibrillation and myotonia in man for the first time. At the same time we instituted routine muscle biopsy in all atrophic conditions. At last it was possible to have histological verification of myositis and early dystrophy. It then became possible to begin the studies of muscle pathology that were published in 1939, 1951 and later in the Chouké Lecture, given here at the College of Physicians of Philadelphia in 1959.

Also in the 1930s the introduction of ventriculography by Dandy was followed by pneumoencephalography and myelography. These procedures greatly facilitated the diagnosis of brain and cord tumor and made possible the precise definition of prolapsed intervertebral disc. Such invasive procedures were not without risk. I remember vividly a description by Gordon Holmes of the death of a patient during lumbar puncture in 1910, and I myself witnessed the death of another patient from embolism during a perisciatic injection of the Sicard type for sciatica, in 1930. Many have had the unpleasant experience of seeing a renewal of spontaneous subarachnoid hemorrhage during lumbar puncture. A tendency to the indiscriminate use of injection procedures in the 1930s elicited some spirited protests by the older generation of neurologists. The witty Irish-born neurologist F.M.R. Walshe called it "the triumph of technique over reason!"

In the 1930s William Lennox and his associates, with the technical assistance of Albert Grass, introduced electroencephalography (EEG) as a routine clinical investigation, which rapidly revolutionized the understanding of epilepsy and related states. Again it took a few years before normal standards could be established. I remember seeing Drs. Lennox and Fred Gibbs in 1936 on their

return from the annual meeting of the American Medical Association in Chicago where, with a three-channel Grass machine and a small cage, they had obtained EEGs to add to their normal files from some 500 physicians who attended the meeting. An enthusiastic associate of Dr. Lennox at that time said to me "now you can throw away your percussion hammer!" The new method did not change neurology to that extent, though it was the first glimpse of the cellular physiology of the human brain. Since that time the recording of cerebral potentials evoked by limb stimulation and the reflex muscle potentials in response to peripheral nerve stimulation (H-reflex) have given an added dimension to the EEG and the electromyogram. Enzyme studies have how added greater precision to muscle biopsy and have made possible the definition of special types of enzyme disorder in muscle.

In 1937 Moniz and Lima reported their new method of angiography of the carotid artery in man, and the syndrome of repeated incidents of contralateral hemiparesis or dysphasia associated with occlusion of this vessel in the neck. Other cases were reported by Andrell (1943) and Ameli and Ashby (1949). The recurrent attacks were attributed to vasospasm in the territory of affected vessels, which led to the extensive use of stellate block and cerebral vasodilators, without notable effect. In 1951 I objected to the notion of vasospasm in this connection,[1] and described the common association of the attacks with falls of systemic blood pressure. This led to the conclusion that such attacks were due to failure of cerebral collateral circulation. At the same time I stressed the importance of maintaining cardiac output. Since that time I demonstrated the transient nature of platelet emboli in other cases. In recent years the relative effectiveness of anticoagulation and of thrombarterectomy in such cases has been debated repeatedly. Among different medical groups there is enormous variation in the choice of treatment for transient ischemic attacks (TIA). In a recent study from six hospitals[2] the use of anticoagulants for vertebrobasilar syndrome varied from 0-82% in different hospital groups, and from 6-35% for patients subjected to endarterectomy for carotid TIAs. The ostensible rationale of these heroic procedures is to prevent catastrophic stroke, but a prospective study by Toole and his associates[3] of 225 patients followed for 3 to 14 years showed that twice as

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1. D. Denny-Brown, "The Treatment of Recurrent Cerebrovascular Symptoms and the Question of 'Vasospasm'." *Med. Clin. North Am.* 35(1951):1457-1484.

2. A. F. Haerer, R. A. Gothschell, P. M. Conneally, M. L. Dyken, D. C. Poskanzer, T. R. Price, P. D. Swanson, and P. R. Calanchini, "Cooperative Study of Hospital Frequency and Character of Transient Ischemic Attacks. III. Variation in Treatment." *JAMA* 238(1977):142-146.

3. J. F. Toole, C. P. Yuson, R. Janeway, F. Johnston, C. Davis, A. R. Cordell, and G. Howard, "Transient Ischemic Attacks: A Prospective Study of 225 Patients." *Neurology (Minneapolis)* 28(1978):746-753.

many patients ultimately succumbed to cardiac disease as to stroke. We ourselves have been greatly impressed by the dangers of arteriography compared with the non-invasive Doppler ophthalmic method of recording, and we deplore the frequent disregard of the possibility that a carotid bruit may relate to the crucial remaining artery in a four-vessel involvement. This procedure involving that artery could well produce a catastrophic episode. In addition a 21.1% stroke mortality rate in 228 carotid endarterectomies in two different hospitals, reported by Easton and Sherman,[4] is unacceptably high. I am greatly disturbed by these figures and urge great caution in treatment of TIAs unless there is a crescendo in frequency and duration. The present status of carotid surgery has all the aspects of a "triumph of technique over reason." In contrast, the response to simple aspirin treatment in two large series[5, 6] has been most remarkable.

The most striking innovation in the last ten years has been the introduction of computer-assisted tomography (CT scan). The recent well-deserved award of the Nobel prize to Allen Cormack and Godfrey Hounsfield has highlighted this revolutionary development. The need for ventriculograms and pneumoencephalograms has almost disappeared. Again, as with all new methods, extravagant claims have been made. The CT scan, which charts abnormal anatomy, cannot displace the EEG, which portrays disordered physiology. The limits of normal variation have yet to be clearly delineated, to avoid for example the diagnosis of Alzheimer's disease attached to a bright lawyer of my acquaintance with slightly larger than "normal" ventricles. He was not given even a simple memory test!

The CT scan has rapidly become the primary and elective method of investigation of any case of suspected brain tumor, obstructive hydrocephalus, or massive cerebral or subdural hematoma, but it does not assist the definition of other neurological disorder, for which the time-honored analysis of motor, sensory and perceptual function and reflex responses, related to neuropathological experience, is still as necessary as ever. I am not alone in firm resistance to endarterectomy for asymptomatic carotid bruits[7] or in patients with severe stroke. It is indeed remarkable that the prospective study of 225 patients by Toole *et al.*[3] failed to show significant difference in outcome between surgically

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4. J. D. Easton and D. G. Sherman, "Stroke and Mortality Rate in Carotid Endarterectomy - 228 Consecutive Operations," *Stroke* 8(1977):565-568.

5. W. S. Fields, N. A. Lemak, R. F. Frankowski, and R. J. Hardy, "Controlled Trial of Aspirin in Cerebral Ischemia," *Stroke* 8(1977):301-316.

6. H. J. M. Barnett, J. W. D. McDonald, and D. L. Sackett, "Aspirin Effective in Males Threatened with Stroke," *Stroke* 9(1978):295-298.

7. W. E. Fields, "The Asymptomatic Carotid Bruit - Operate or Not," *Stroke* 9(1978):269-271.

treated, medically treated, and untreated groups of patients with transient ischemic attacks. One still cannot throw away the percussion hammer. The evolution of disordered neural physiology remains the primary lead to neuropathology. Decisions regarding risky treatments cannot be made by instrument alone.

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Richard Pulteney (1730-1801): Linnean Botanist and Cardiologist

H. A. WALDRON

DURING the eighteenth century many physicians actively studied subjects peripheral to medicine. Some of these men are remembered for the advances in knowledge which they made, rather than for anything they accomplished in medicine. Richard Pulteney (Figure 1) is just such a man, for he is best known as a botanist and for popularizing the Linnean system in England. He also gave the first description in English of what is now known as Fallot's tetralogy.

Pulteney was born in Mountsorrel in Leicestershire on 17 February 1730. He was the only child of the thirteen born to Samuel and Mary Pulteney to survive beyond maturity. He himself suffered at an early age from a pulmonary disorder which allegedly left him with a delicate constitution. Despite this impediment he lived until he was 72. His father, Samuel Pulteney, was a tailor in comfortable circumstances who owned property in Leicestershire which Richard inherited and which he administered throughout his life.

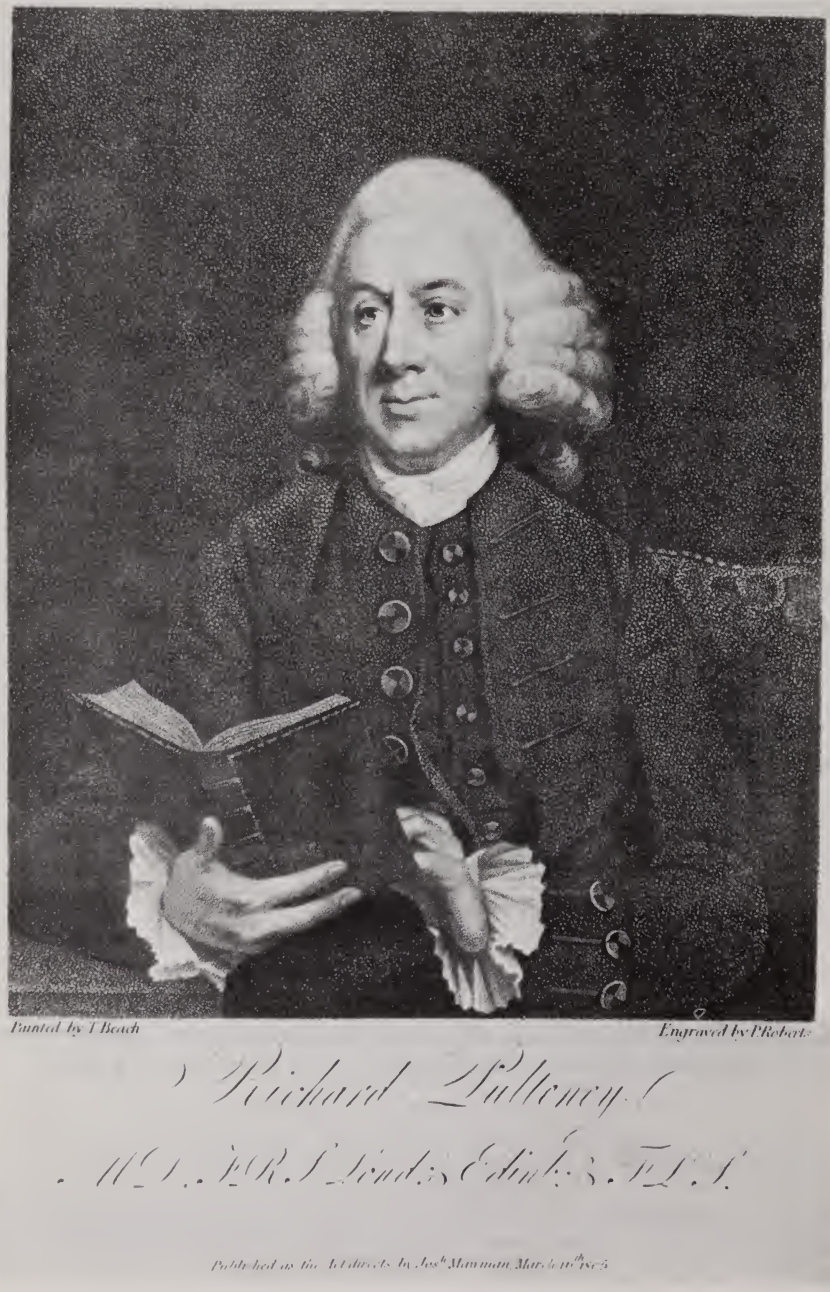
His education began at the Old Free School in Loughborough, but he did not join in the boisterous activities of his schoolmates; instead he was to be seen walking through the fields studying his herbal. This early interest in botany had been stimulated and encouraged by his maternal uncle, George Tomlinson, who perhaps thought that this was a more suitable diversion for a boy in delicate health than the normal rough and tumble. Pulteney retained a warm affection for his uncle. Writing towards the end of his life, he said that he revered Tomlinson's memory "with the truest affection, having received from him as from a father, the genuine dictates of wisdom, virtue, and religion; all of which were truly exemplified in his own conduct throughout the whole of his life."

ACKNOWLEDGMENTS

I am very grateful to Mr. Gavin Bridson, Librarian of the Linnean Society of London for bringing to my notice the collection of Pulteney's letters which is in the possession of the Society.

Note on Manuscript Sources

Pulteney's letters to Garthshore and Watson, and Garthshore's to Pulteney are in the library of the Linnean Society of London; Baker's letters are in the library of the Royal College of Physicians of London.


Painted by J. Beach
Engraved by P. Roberts
Richard Pulteney
M.D. F.R.S. Lond. & Edinb. & F.L.S.
Published as the Act directs by Jos.h Mawman, March 1st 1805

Richard Pulteney. Reproduced from an engraving in the Historical Collections of the Francis C. Wood Institute of the College of Physicians of Philadelphia.

After his preliminary schooling, Pulteney was apprenticed to Thomas Harris, an apothecary in Loughborough. In April 1752 he went into the service of Isaac Wylde, an apothecary in Nottingham. He was unhappy there and, in October of the same year, he set up his own business in a shop in Saturday Market in Leicester. His old master Thomas Harris helped him in this venture by purchasing on his behalf the fittings of an apothecary in Melton Mowbary. Business was slow, however, because as Rees[1] put it

> having been educated a Calvinist dissenter, the good Christians of that town, who chanced to have different prejudices, of course gave him but little support.

He had to regulate his life with the utmost economy. In his study of botany and natural history he was hampered through being unable to buy the books that he needed.

Having already established contact by post with a number of botanists, during this period he began to expand his correspondence. Amongst the earliest with whom he exchanged letters was William Watson, one of the three men who were to play a major role in his life. Watson was then still practicing as an apothecary in London, although his botanical and electrical researches had brought him such a reputation that in 1741 he had been elected to the fellowship of the Royal Society and in 1745 he had received the Society's Copley Medal for his work on electricity.

Pulteney was writing to Watson by 1755 and was receiving encouragement in his botanical studies. Watson may have seen in Pulteney a kindred spirit. He took the opportunity to introduce the young apothecary from Leicester into the company of the Earl of Macclesfield, president of the Royal Society, and of other men whom he thought would help Pulteney to prosper.

Pulteney's earliest botanical papers were all channelled through Watson, who edited them and placed them where he thought they were best suited, usually the *Gentleman's Magazine*. In 1756 Pulteney's first paper appeared in the *Philosophical Transactions of the Royal Society,* having been read before the Society by Watson. In the *Transactions*[2] the paper (Pulteney 1756a) was prefaced by a letter from Watson to the Earl of Macclesfield in which he said:

> Mr. Pulteney is a person of real merit, well skilled not only in what relates to his profession, but also in various parts of Natural History. His botanical knowledge is very extensive and he is very zealous of promoting it.

It was Watson also who communicated Pulteney's second and third papers to the Royal Society in 1757 and 1758. The first of these two was an account of the botanical and medical histories of the deadly nightshade.[3] In it he demonstrated a familiarity with the writers of antiquity remarkable in a man who had not been to

1. A. Rees, "Richard Pulteney," in *The Cyclopaedia; or the Universal Dictionary of Arts, Sciences and Literature,* vol. 28 (London: Longmans, Hurst, Rees, Orme and Brown, 1819).

2. R. Pulteney, *Philosophical Transactions of the Royal Society* 49(1756):803-868.

3. Ibid., 50(1758):62-88.

university. The essay was a tribute to his efforts at self-improvement. His prime interest in presenting the paper was practical, for he wrote:

> It is of great importance, that the knowledge of poisonous plants should be extended as much as possible, that they may be better avoided, and their fatal effects thro' mistake be guarded against.

"This paper," wrote Watson, "met with the most favourable reception possible, and the Society desired me to return you their thanks, which I hereby do with great pleasure."

At this time Pulteney met Maxwell Garthshore and George Baker, the two men who, together with Watson, were to be the architects of his career. He met Garthshore in Leicester during December 1758. The meeting had a profound effect on Garthshore:

> I take this earliest opportunity in my power [he writes] to thank you for your Civilities at Leicester and to assure you that the reflection of having gained such an acquaintance is to me a very high Enjoyment. I recollect our agreeable interview with a feeling and sense of unmixed Pleasure and wish with fervency such Comforts always within my reach.... May I hope sometimes to have a few Hours Conversation with you. Will you come to Uppingham — I have a great many things to talk with you, Something within me whispers me, we may mutually assist one another, some means, some method Time and mature reflection may present whereby we may advance one another's Interest as well as Happiness.

Garthshore offered to invite Baker to meet Pulteney should he come to Uppingham, and this is doubtless how it came about. At that time neither Garthshore nor Baker had achieved the fame which Watson then enjoyed. Each was practicing his profession, Baker as a physician in Stamford, and Garthshore as an accoucher in Uppingham, ten miles from Stamford.

Both Baker and Garthshore thought highly of Pulteney. In the early days of his residence in London in the 1760s, Baker often mentioned Pulteney in his letters to Garthshore. The bond between them was evidently close. In one letter Baker warned Garthshore never to "...repete anything I say in my letter to anybody but P." And in another, "I wish I was a great man that I might provide for him."

It was to Baker that Pulteney sent the script of his first essay on a clinico-pathological theme in 1761. Watson communicated it to the Royal Society. In this paper Pulteney demonstrated that he was as acute an observer of clinical signs as of botanical.

The case was of a man of thirty-two who had consulted Pulteney because the palpitations to which he had been subject for many years had suddenly become aggravated to a great degree after a cold bath. Pulteney noted that the pulse was 110-120 strokes a minute and that 'the palpitation of heart struck me instantly as it shook his whole body at every stroke.' An additional feature was that "he could not sleep on the left side at all, and was always easiest in an erect posture. He was commonly awakened with a sense of suffocation."

Pulteney was unable to recommend any treatment to alleviate his patient's symptoms "except bleeding, which afforded a relief; but very temporary, and weakened him too much to be repeated more than once. All that it seemed to do

for him was the procuring him rather more sleep the night after, than he usually had."

In the course of a few weeks the condition of the patient worsened, he developed gross edema and by the middle of April he could "...not speak or stir without being ready to expire from want of breath." He died shortly after. Pulteney's report of the state of the cardiovascular system was as follows:

> The heart itself was of an enormous size, and of a very pale colour, and loose and flaccid in its texture, to a very remarkable degree. As far as I could judge, from the most careful examination and comparison, I could not find that either of the auricles or ventricles bore an extraordinary proportion to the other. The whole heart might be said to be entirely aneurismical. The parieties were everywhere thin, in proportion to the size of the whole. There was no particular enlargement of the aorta, as far as I traced it, which I did to some distance; but its texture as that of the heart, was very lax and flabby. When the heart was cut short from the great vessels, emptied of the coagula, and washed as clean as possible it weighted upwards of twenty-eight ounces avoirdupois weight.

Pulteney thought the changes were due to rickets, which the patient had had as a child. In this condition, he said, "...the whole system is found to be in a lax debilitated state, and the heart is said to be so in particular."

When the paper appeared in *Philosophical Transactions of the Royal Society,*[4] Baker wrote approvingly to Garthshore that "Pulteney's Heart-case makes a figure in our *Transactions* just published, and, I dare say, will gain him credit."

Earlier in the year, Baker had been one of those who had proposed Pulteney for election to the Royal Society. Others supporting him had included Watson and Macclesfield although, initially, Watson demurred on the grounds that in the absence of an academic qualification, the difficulties in securing Pulteney's election might be insurmountable. His chief concern was that Pulteney should give priority to a medical degree. Baker dismissed Watson's fears and by November thought the time was ripe. "P. must I suppose," he writes to Garthshore, "sometime in the winter, come up, and be admitted F.R.S." And less than two weeks after this letter was written, on 25 November 1762, Pulteney became a Fellow of the Royal Society.

Watson, however, was not alone in suggesting to Pulteney that he should turn physician; it was a constant theme in Baker's letters both to Pulteney and to Garthshore. Pulteney, however, was stubborn in his refusal to heed the advice. Baker, who was exhorting Garthshore to take similar action with like lack of success, wrote despairingly to Garthshore, "Why don't you turn Physician? You are almost as tedious in your determination as poor P-y." And to Pulteney himself Baker wrote in exasperation, "You have too faint a heart."

It is doubtful whether Pulteney ever would have decided to become a physician if Garthshore, who had at last been persuaded himself, had not asked him to travel up to Edinburgh so that they could take their degrees together.

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4. Ibid., 52(1761):344-353.

Pulteney's thesis had to be written in great haste and he was, as he told Watson after the event

> ...hurt in many instance from want of Books that I should have hoped to have consulted although Dr. S(utton) was kind enough to supply me with all that were in his possession which could afford me assistance.

Baker was taken by surprise by the speed with which Pulteney acted once his resistance had been overcome.

> From what I have observ'd of your irresolution I did not imagine that you had any probability of going to E. Now you have given me so short a time that I have been oblig'd to hurry over your paper, and probably have left errors uncorrected. These you must have remedy'd by some other hand.

In Edinburgh, Pulteney and Garthshore stayed with a cousin of Garthshore's and they both proceeded M.D. on 8 May 1764. Pulteney met with some opposition from the students in Edinburgh who were opposed to degrees being awarded to those who had not been resident at the university and who had never attended a course of lectures. Pulteney's reputation had travelled before him, however, and his influential friends smoothed his way so that he was allowed to take his degree. He stayed in Edinburgh for some considerable time after Garthshore, much to the consternation of his locum, who was attending to the business in Leicester. When he did return to Leicester on June 2, he was uncertain of his future. Practice in Leicester was out of the question because he felt that he could not set up in opposition to his friend John Sutton and his letters to Watson and Baker make it clear that he did not feel he had solved any of his problems by turning physician. He could not practice, he could not find a buyer for his shop and he had no position to which to go.

Watson saw one possibility, however. After his return from Edinburgh, Pulteney had made a study of his genealogy and had established a link between himself and William Pulteney, the Earl of Bath. Watson wrote to Pulteney suggesting he come to London where he could be introduced to Mrs. Edward Montagu, who would in turn introduce him to Bath at one of her salons.

> It is highly expeditious that I should introduce you to this lady...before she leaves London for the summer [writes Watson]. Previous to this you must procure a Suit of fashionable London clothes, and get in some degree a habit of wearing a Sword, and putting on the exterior of a Doctor.

All was arranged and the Earl offered Pulteney the position as his personal physician on the strength of their family ties. The offer was accepted and arrangements were set in hand for Pulteney to accompany the Earl overseas, but the Earl died.

Far from being dismayed by this unhappy outcome, Watson turned his attention to the Earl's younger brother in the hope that he might be persuaded to patronize his newfound kinsman. Watson and Baker had been working independently in trying to secure Pulteney's future and Baker was kept in ignorance of Watson's efforts, with the result that Pulteney found himself embarrassed by having too many doors opening at once. He wrote to Watson:

> I am informed by a letter from my friend Garth that there is at this time an excellent vacancy for a physician at B(landford) in D(orset) and I am strongly recommended to go thither instantly with the Assurance of all the Assistance that Dr. B. can give and who I fear will take it very ill if I slight this opportunity.

And so it was to Blandford that Pulteney went. He succeeded in selling his shop to one Robert Smith, a surgeon from Edinburgh, and went to London in April 1765 to qualify as an extra-licentiate of the College of Physicians before setting out for Dorset.

Both Baker and Watson gave him letters of introduction to wealthy families in the county and he rapidly established himself and made for himself both a great reputation and a considerable fortune. His practice included not only the whole of Dorset, but also parts of Hampshire, Wiltshire and Somerset. Nevertheless, he still found time to continue his studies of botany and natural history, building up a notable collection of shells, a museum of natural history and a fine library. Nor were his medical researches neglected. On 28 May 1785 Baker read before the College of Physicians a paper Pulteney had sent him on "An Extraordinary Conformation of the Heart."[5]

The subject of the paper was a young boy who, for some time before his death, had been unable to '...walk across a room, without turning almost black in the face and hands; and becoming faint, and almost breathless.'

At post-mortem, the state of the heart was described thus:

> The *pericardium* contained a due proportion of fluid; and the heart itself was firm in its texture, and of a natural size. Nothing extraordinary was observed in the capacity of general conformation of the sinuses, or ventricles; except, that the left auricle was very small. Neither did the most accurate examination show, that there was any fault in the tricuspid, or in the mitral valves of the heart, or in the semilunar valves of the *aorta,* or in those of the *arteria pulmonalis*. But, on examining the ventricles, and the *aorta,* a canal was found communicating with both the ventricles. This was situated in an oblique direction, near the *basis* of the heart, so capacious as to admit of passing the end of a finger from the *aorta,* with equal facility into either *ventricle;* the *septum* of the ventricles appearing to terminate with this canal; which was totally unfurnished with any thing like valves, and was in every part perfectly smooth.
>
> On examining the entrance of the pulmonary artery, within the ventricle, notwithstanding what is said by anatomists, of the callosity of the ring in the opening, it was judged, that, in this subject, the ring itself was much smaller, and more firm than is usual.

Although Pulteney does not mention right ventricular hypertrophy, this description is clearly that of the infundibular type of Fallot's tetralogy. His was not the first account of the abnormality; the credit is due to Edward Sandifort, whose Latin account appeared in 1777.[6] The first description of the abnormality *in English* appeared under the name of William Hunter in 1784.[7] Whilst both Sandifort and Hunter have been credited by Willius and Dry[8] in their history of

5. R. Pulteney, *Medical Transactions of the College of Physicians of London* 3(1785):339-344.

6. E. Sandifort, *Observationes Anatomico-Pathologicae* (Leyden: P.v.d.Eyk and D. Vygh. 1777).

7. W. Hunter, *Medical Observations and Inquiries* 6(1784):291-309.

8. F. A. Willius and T. J. Dry, *A History of the Heart and the Circulation* (Philadelphia: W. B. Saunders, 1948).

the heart and circulation, with preceding Fallot in the recognition of the condition, Pulteney's anticipation has so far been unnoticed. In fact, the evidence suggests that Hunter's observations went into print *after* Pulteney had presented his case. Hunter's paper was read posthumously before the Medical Society of London on 28 July 1783, but was not published in the *Medical Observations and Inquiries* until the following year. The paper bore a preface in which it is made clear that Hunter knew of Pulteney's description of the condition. He says:

> In obedience to your commands, Gentlemen, I now communicate the cases which I mentioned to you, when *Dr. Pulteney's account of an extraordinary conformation of the heart was read,** and which you were desirous of presenting with it to the public.

Hunter's account is similar in all respects to Pulteney's, as he acknowledged himself:

> There was a singular conformation of the heart which allowed only a very small portion of the blood to pass through the lungs. That peculiarity was partly in the pulmonary artery, which was so small at its beginnings from the right ventricle, that it would barely give passage to a small probe; ... But there was another peculiarity, in which it was similar to the case related by Dr. Pulteney, viz., the septum cordis was deficient, or perforated at the basis of the heart; so as, in the dead body, to allow my thumb (a small one) to pass across, from either ventricle to the other, the orifice of the aorta being situated close to this perforation, as in the action of the heart, to receive blood from the right ventricle as well as from the left.

There is no record of where Pulteney first gave his account of the malformation, but from Hunter's introduction it seems most reasonable to suppose that it was at a meeting of the Medical Society of London.

After Hunter's death Pulteney wrote to Watson to ask if he would enquire about his paper, which was to have been in the sixth volume of *Medical Observations and Inquiries,* the same volume as contained Hunter's paper. Watson was unable to trace it, supposing that it had been lost amongst Hunter's papers, which were in confusion following his death. In the end, Baker read the paper before the College of Physicians in 1785 and it appeared in the *Medical Transactions of the College of Physicians* later the same year.[9] The fact that Pulteney's account antedates Hunter's explains why no mention is given to the latter in his paper for his reference to earlier authors was always extensive. Indeed, it was his habit, as he wrote elsewhere, to consult 'all the older authors which I have it in my power to refer to.' It is therefore surprising that he does not appear to have had prior knowledge of Sandifort's work, and even more so that Baker, whose knowledge of the literature was legendary, did not either.

There is thus good reason to acknowledge Pulteney as the first to recognize this malformation in England and he should, at the very least, stand before Hunter in the history of the condition.

Botany, however, continued to occupy most of Pulteney's time and interest. In 1781 he published his most famous work, his *General View of the Writings of Linnaeus.*[10] From an early stage in his career, Pulteney had been interested in

9. Pulteney (note 5).

10. R. Pulteney, *A General View of the Writings of Linnaeus* (London: Payne and White, 1781).

* my italics

Linnaeus and he had already published an account of Linnaeus's life in the *Gentleman's Magazine* as well as a long review of the new edition of the *Systema Naturae.*[11]

His General View was well received in academic circles, the edition being sold out in four years. It was translated into French in 1789. Pulteney prepared a new edition but this did not appear until 1805, four years after his death. The book did more than any other, with the exception of those by Stillingfleet, to introduce and popularize the Linnean system in England. Pulteney's contribution was recognized by the Royal Academy of Stockholm, which presented him with two medals struck in honour of Linnaeus. Smith named a genus of plants *Pultenaea* as a tribute to one who "so essentially contributed to the introduction and establishment of Linnean botany in this country."

Pulteney's other large-scale work was not so well received. His *Historical Sketches of the Progress of Botany*[12] was published in two volumes, the second being dedicated jointly to Baker and Garthshore. These sketches were to have been an introduction to a flora of the British Isles, but Pulteney was persuaded to publish them separately. It was a step he after regretted. The flora was never completed and, in a letter to a friend, he expressed his dissatisfaction with the work: "I have no expectation that a book of this nature will come to a second edition in my life-time; after I am gone somebody will take it up and make a good work of it, now I have led the way."

Despite his many activities, Pulteney found life at Blandford restrictive because there were few people with whom he could discuss the topics which interested him. In summer he was able to visit London and see his friends, but the onset of winter made such journeys impracticable on the existing roads. He despaired of these dull months and once asked Garthshore to buy him a house in London. The arrangements fell through, however, for what reasons we know not, and Pulteney lived out his life in Dorset.

He died of pneumonia in 1801. His last illness was one week long. Under the terms of his will his collection of shells and his herbarium passed to the Linnean Society, with which he had been closely associated since its inception. His library was sold in 1802.

Of Pulteney's natural talents there is no doubt, but he might have lived out his life as an apothecary in Leicester had not Watson, Baker and Garthshore encouraged him to forward his career. His is by no means a unique case, but it does serve to illustrate that social barriers could be surmounted in the eighteenth century with the aid of those already on the right side. Pulteney's character was epitomised by Rees (1819) in words which make a suitable epitaph:

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11. Idem., *Gentleman's Magazine* 26(1756):415-417; 463-465 and 29(1759):454-457; 509-511; 564-566.

12. Idem., *Historical Sketches of the Progress of Botany,* 2 vols. (London, T. Cadell, 1790).

Few men have enjoyed more entirely the respect and affection of his acquaintance than Dr. Pulteney. An air of urbanity and gaiety was diffused over his countenance and manners, which bespoke the simplicity, candour, and liberality of his mind. His ardour for science was unbounded; and as lively at the close of his life, as at the beginning of his literary career. His religion was unaffected, and devoid of bigotry or intolerance; the only feelings which he contemplated without sympathy or indulgence. His conversation, like his morals, was spotless; and his cheerfulness flowed from the never-failing spring of a benevolent and honest heart.

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Annotated Bibliography of Paleopathology: 1970-1979 Part I, A-C

MICHAEL R. ZIMMERMAN

INTRODUCTION

A symposium sponsored by the National Academy of Sciences-National Research Council on January 14, 1965[1] provided the stimulus for a remarkable growth in interest and research in paleopathology in the 1970s, primarily due to the activities of three groups. The Paleopathology Association was founded in Detroit in 1973 by Aidan Cockburn and charter members Eve Cockburn, Theodore A. Reyman, William Peck, Robin Barraco, Raymond Henry, George Lynn, Henry Normile, Irving Burton, J. Lawrence Angel, Peter Lewin, Patrick Horne, Michael Zimmerman and Eugen Strouhal. In addition to publishing a quarterly, the *Paleopathology Newsletter,* this group has sponsored the examination of a number of Egyptian, Alaskan, and Peruvian mummies, the presentation of many symposia, and the publication of several monographs.

A second group, directed by Marvin Allison and Enrique Gerszten of the Pathology Department of the Medical College of Virginia in Richmond, has conducted over the past decade an extensive survey of Peruvian and Chilean mummies. The Paleopathology Club of the International Academy of Pathology has developed from this group.

A seminar in Paleopathology was held annually at the Smithsonian Institution from 1971 to 1974. This full length course, under the direction of J. Lawrence Angel and Donald J. Ortner, and with the co-operation of T. Dale Stewart, Lent Johnson and Walter Putschar, provided a third major impetus in paleopathology.

A Registry of Human Paleopathology was established at the Smithsonian at the suggestion of Saul Jarcho and under the direction of Dr. Ortner.

ACKNOWLEDGMENTS

A great debt is owed to Michael Hoffman for his organization of the "Annotated Bibliography" section of the *Paleopathology Newsletter.* He and I have had the assistance of a number of members of the Paleopathology Association in searching the literature and abstracting articles. I thank the following for their efforts: J. Lawrence Angel, Nelly Amaya, Antonio Ascenzi, Arthur Aufderheide, Ethne Barnes, Don Bauer, Walter Birkby, Sheilagh Brooks, Irving Burton, Aidan Cockburn, Eve Cockburn, William Cornwall, Jean Dastague, Howard Duncan, Peter Gooch, Patrick Harney, Patrick Horne, Martha Houston, Robert Jurmain, Thomas Mulinsky, Donald J. Ortner, William Peck, Michael Pietrusewsky, Theodore A. Reyman, A. T. Sandison, Shelly Saunders, Frank Tabrah, A. J. Verster and the late Calvin Wells. I would like to thank Drs. Saul Jarcho and Ronald Kotre for their help and encouragement. The references have been reviewed with a critical eye, and I assume responsibility for any errors in preparing and editing the abstracts for this publication.

These groups and individual investigators have produced many publications covering both the paleopathology of skeletons and that of mummies. An "Annotated Bibliography," edited initially by Michael Hoffmen, and currently by me, has been an integral section of the *Paleopathology Newsletter* since its inception. The current bibliography is in large part based on the *Newsletter* entries, edited for a more uniform style, supplemented by material from my files, and indexed. The emphasis is on publications issued since 1970, as reviews of the earlier literature are provided by Brothwell and Sandison (1967), Goldstein (1970), Sandison (1970) and Armelagos et al. (1971). The occasional earlier references included herein are those not cited in one of these four sources.

The references are listed alphabetically by senior author and are numbered consecutively for indexing. The index refers to specific disease entities and to geographic and ethnic identities; it will be published at the end of the bibliography. Journal abbreviations are in the standard *Index Medicus* style and the full titles are given in the following section. A few publications could not be located, but the references are given without abstracts, for the convenience of the reader.

JOURNALS CITED

ACTA FACULTATIS RERUM NATURALIUM UNIVERSITATIS COMENIANAE
[Bratislava, Czechoslovakia. Univerzita. Prirodovedecka Fakulta. Acta]
AIN SHAMS MEDICAL JOURNAL (Cairo)
AMERICAN ANTIQUITY
AMERICAN IMAGO
AMERICAN JOURNAL OF ARCHEOLOGY
AMERICAN JOURNAL OF DISEASES OF CHILDREN
AMERICAN JOURNAL OF ORTHOPEDICS (1960-67). New title: AMERICAN JOURNAL OF ORTHOPEDIC SURGERY
AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY
AMERICAN JOURNAL OF ROENTGENOLOGY, RADIATION THERAPY AND NUCLEAR MEDICINE
AMERICAN REVIEW OF RESPIRATORY DISEASES
ANATOLIAN STUDIES
ANNALEN NATURHISTORISCHES MUSEUM WIEN
ANNALES: ECONOMIES, SOCIETES, CIVILISATIONS
ANNALES COLLEGII MEDICI ANTVERPSIENSIS (Belgium)
ANNALES DE RADIOLOGIE (Paris)
ANNALES DU SERVICE DES ANTIQUITES DE L'EGYPTE
ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY
ANTHROPOLOGIAI KOZLEMENYEK (Budapest)
ANTHROPOLOGICAL PAPERS OF THE AMERICAN MUSEUM OF NATURAL HISTORY (New York)
ANTHROPOLOGIE
ANTHROPOLOGISCHE GESSELSCHAFT IN WIEN

1. Published in *Human Paleopathology*, ed. Saul Jarcho, M.D. (New Haven: Yale University Press, 1966).

ANTIQUITY
ANTWERPEN
ARCHEOLOGY
ARCHAIC NOTES: NEWSLETTER OF THE ONTARIO ARCHEOLOGICAL SOCIETY. Superseded by: ONTARIO ARCHAEOLOGY
ARCHIVES D'ANATOMIE ET DE CYTOLOGIE PATHOLOGIQUES (Paris)
ARCHIVES OF DERMATOLOGY
ARCHIVES OF ENVIRONMENTAL HEALTH
ARTHRITIS AND RHEUMATISM
ARIZONA MEDICINE
AUSTRALIAN DENTAL JOURNAL
BEITRAEGE ZUR GERICHTLICHEN MEDIZIN (Vienna)
BEITRAEGE ZUR PATHOLOGIE
BIOLOGY AND HUMAN AFFAIRS
BOLETIN CHILENO DE PARASITOLOGIA
BOLLETINE DELLA SOCIETA SARDA SCIENCE NATURALE
BOLLETTINO DELLA SOCIETA ITALIANA DE BIOLOGIA SPERIMENTALE
BRITISH JOURNAL OF DERMATOLOGY
BRITISH MEDICAL JOURNAL
BULLETIN DE L'ACADEMIE NATIONAL DE MEDECIN (Paris)
BULLETIN DE LA SOCIETE DE MYCOLOGIE MEDICALE
BULLETIN ET MEMOIRS DE LA SOCIETE D'ANTHROPOLOGIE DE PARIS
BULLETIN OF THE ACADEMY OF MEDICINE, TORONTO
BULLETIN OF THE HISTORY OF MEDICINE
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TOLEDO AREA ABORIGINAL RESEARCH CLUB. BULLETIN
TOURING TOPICS. Superseded in 1933 by WESTWAYS
TRANSACTIONS AND STUDIES OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA
TRANSACTIONS OF THE NEW YORK ACADEMY OF SCIENCES
TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, LONDON
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ZENTRALBLATT FUER BAKTERIOLOGIE, PARASITENKUNDE, INFEKTIONS-KRANKHEITEN UND HYGIENE
ZOOLOGICA POLANIAE (Poland)

ABSTRACTED ARTICLES

A

1. **Aldred, C.** 1961. The tomb of Akhenaten at Thebes. *J. Egypt. Arch.* 47:41-65.

   The archeology, physical anthropology and paleopathology of the contents of a tomb considered to be that of Akhenaten are presented. All sides of the controversy about Akhenaten's habitus are discussed and Froehlich's syndrome is suggested as a diagnosis.

2. **Aldred, C. and Sandison, A. T.** 1962. The Pharaoh Akhenaten: A problem in Egyptology and pathology. *Bull. Hist. Med.* 36:293-316.

   The evidence presented in Aldred's 1961 article is reviewed and a detailed re-examination of the skeletal remains is proposed. Froehlich's syndrome remains the suggested diagnosis.

3. **Allison, M. J. and Gerszten, E.** 1975. Paleopathology in Peruvian mummies: application of modern techniques. Richmond, Va.: Medical College of Virginia.

   This publication from the Department of Pathology, Medical College of Virginia, is required reading for all who work with Peruvian or other mummies. It provides a mass of information on methods of dating, radiographic studies, age and sex determination and autopsy procedures. It gives precise details on rehydrating and embedding tissues, cutting sections and staining by twelve different methods. Electon microscopy and serological techniques are described. Serological techniques in bacterial antigen studies are outlined without any conclusions or discussion. Those interested in obtaining copies should contact Dr. Allison at the Medical College of Virginia.

4. **Allison, M. J., Gerszten, E., Martinez, A. J. et al.** 1977. Generalized connective tissue disease in a mummy from the Huari culture (Peru). *Bull. N.Y. Acad. Med.* 53:292-301.

   The mummy of a young Peruvian girl dating from the ninth century A.D. showed many of the features of connective tissue disease, including alopecia, thickening of the skin, pericarditis, pleuritis and renal disease. Microscopic examination revealed fibrinoid necrosis of blood vessels. Electron microscopic findings were also consistent with the suggested diagnosis of systemic lupus erythematosus.

5. **Allison, M. J., Gerszten, E. and Shadomy, H. J.** 1979. Paracoccidiodomycosis in a northern Chilean mummy. *Bull. N.Y. Acad. Med.* 55:670-683.

   A case of South American blastomycosis in a third century A.D. mummy is presented. The photomicrographs, including electron microscopy, are remarkable, although the gross photographs are somewhat difficult to interpret. Correlation of pathologic findings with archeologic and current ethnographic data is an important part of this paper.

6. **Allison, M. J., Gerszten, E., Sotil, R. et al.** 1976. Primary generalized hyperostosis in ancient Peru. *Med. Coll. Va. Quart.* 12:49-51.

   An interesting case of a familial disease that results in abnormally thickened bones is reported from Peru in a mummy dated at about 1,000 A.D. The authors differentiate this condition from Paget's disease and other forms of hyperostosis in reporting the first case from South America. The familial nature of the disorder may make it valuable in population studies.

7. **Allison, M. J., Hossaini, A. A., Castro, N. et al.** 1976. ABO blood groups in Peruvian mummies. I. An evaluation of techniques. *Am. J. Phys.* Anthrop. 44:55-62.

   Blood group determinations were found to be identical using three different methods: agglutination-inhibition, induction of antibody production and mixed cell agglutination. The implications of finding A, B, AB and O in pre-Columbian remains are discussed.

8. **Allison, M. J., Hossaini, A. A., Munizaga, J. et al.** 1978. ABO blood groups in Chilean and Peruvian mummies. II. Results of agglutination-inhibition technique. *Am. J. Phys. Anthrop.* 49:139-142.

   A carefully controlled study revealed significant differences in blood group distribution between Peruvian and Chilean mummies. Possible reasons for the observed differences are discussed and future studies are suggested.

9. **Allison, M. J., Mendoza, D. and Pezzia, A.** 1973. Documentation of a case of tuberculosis in pre-Columbian America. *Am. Rev. Resp. Dis.* 107:985-991.

   A child from the Nazca culture of southern Peru, dated ca. 700 A.D., showed evidence of Pott's disease with a psoas abscess and tuberculosis involving the lung, pleura, liver and kidney. Acid-fast organisms were demonstrated.

10. **Allison, M. J., Mendoza, D. and Pezzia, A.** 1974. A radiographic approach to childhood illness in pre-Columbian inhabitants of southern Peru. *Am. J. Phys. Anthrop.* 40:409-416.

    The presence of Harris lines, considered to be indicators of starvation or severe infection, was sought in 108 individuals from six cultures from Ica Peru covering a span of 2,600 years. Those from mountain cultures had fewer lines than those of the coast, indicating healthier childhoods. People from the Inca culture of 450 years ago had patterns similar to those present today.

11. **Allison, M. J. and Pezzia, A.** 1976. Treatment of head wounds in pre-Columbian and colonial Peru. *Med. Coll. Va. Quart.* 12:74-79.

Of 228 ancient Peruvian skulls examined for evidence of disease, 39 showed fractures and six revealed other disease processes. Surgical techniques used in treatment included trephination as well as other methods employed to remove bone from the skull. The authors state that the therapy was modestly successful and that more trephinations were done in ancient Peru than in all other parts of the ancient world combined. The methods employed by the ancient Peruvian practitioners included circular and cross cutting, drilling and scraping. The most common indication for surgery was fracture, although evidence is presented that some surgical procedures were performed for other types of disease involving the skull.

12. **Allison, M. J., Pezzia, A., Gerszten, E. et al.**: 1974a. Aspiration pneumonia due to teeth, 950 A.D. and 1973 A.D. *South. Med. J.* 67:479-483.

Two cases are studied. The first is a Peruvian mummy of 1,000 years ago, belonging to the Tiahuanaco or Huari culture, the second is modern. Both the mummy and the modern hospital patient had developed pulmonary infection secondary to impaction of a molar tooth in a bronchus.

13. **Allison, M. J., Pezzia, A., Gerszten, E. et al.** 1974b. A case of Carrion's disease associated with human sacrifice from the Huari culture of southern Peru. *Am. J. Phys. Anthrop.* 41:295-300.

A case of Carrion's disease in the verruga phase from a Peruvian mummy is described in gross, histologic, electron microscopic and bacteriologic terms. The 20-year-old man had both hands in his mouth, most of the internal organs removed, and a clean severance of buttocks and lower limbs in the lower lumbar region. These unusual findings led the investigators to propose that the man might have been sacrificed and the missing organs used in divination rites.

14. **Allison, M. J., Pezzia, A., Hasegawa, I., et al.** 1974. A case of hookworm infestation in a pre-Columbian American. *Am. J. Phys. Anthrop.* 41:103-106.

For more than half a century, parasitologists have argued about the introduction of hookworms to the Americas by African slaves. This work settles the matter. Africans may have carried some, but hookworms existed in America before Columbus arrived.

15. **Alpagut, B.** 1979. Some paleopathological cases of the ancient Anatolian mandibles. *J. Hum. Evol.* 8:571-574.

Temporomandibular arthritis (one with ankylosis) is described in four Anatolian skulls from the Neolithic, Chalcolithic and Middle Bronze ages.

16. **Anderson, J. E.** 1962. A pre-Iroquois burial site. *Ont. Arch., Series B.* No. 2:39-46.

Pathologic findings in the remains of 24 individuals (adults and children) from a site near Bradford, Ontario included: relatively frequent traumatic lesions, with craniofacial and infracranial fracture (healed and unhealed), ossified subperiosteal hematoma, and mutilation degenerative joint disease; alveolodental lesions (caries and abscesses).

17. **Andrews, J.** 1972. *The paleopathology of the eastern Great Basin Fremont population.* M.A. Thesis, Univ. of Utah.

Examination was made of 61 adults and 27 sub-adults of the Fremont population. The skeletons were divided into 5 groups for analysis; the date ranged from A.D. 400 to A.D. 1300. Although the number of cases is not significant statistically, it was found that the later southern groups suffered more often from communicable disease, such as osteitis and dental abscess, while the early northern groups showed evidence of diseases related to diet, such as protein deficiency or starvation. Differing economic bases and settlement patterns are thought to account for these differences. The southern groups were more settled and supplemented their hunting and gathering with the cultivation of maize, while the more nomadic northern groups were limited to hunting and gathering.

18. **Angel, J. L.** 1971. Early neolithic skeletons from Catal Huyuk. *Anatol. Stud.* 21:77-98.

The 7th millennium B.C. people of this location in Turkey were early farmers. The skeletons of 216 adults and 72 infants and children were broken and fragmentary. This paper contains a mass of demographic data and photographs of disease. The most important finding was that 40% of the adults had porotic hyperostosis, a condition which is sometimes a reflection of malaria, although it can occur in any severe anemia. Other skeletal and dental conditions are also described.

19. **Angel, J. L.** 1972a. Human skeletons from grave circles at Mycenae. In: *The tomb circle B of Mycenae,* ed. G.E. Mylonas. Athens, Athens Archeological Society.

The rulers buried in the Mycenaean shaft graves about 1600 B.C. were, on the average, 5 cm. taller than their subjects. They have remarkably thick bones and massive heads and bodies. Dental disease is rare but arthritis is common. Other findings are head wounds, vertebral fractures, a trephination, and one case of gallstones.

20. **Angel, J. L.** 1972b. Ecology and population in the eastern Mediterranean. *World Archeol.* 4:88-105.

An attempt is made to link together the complex factors controlling population size, mortality and longevity in a specific area, based on data from ancient sites and human skeletal material. Agriculture, sea levels, malaria and other factors are considered.

21. **Angel, J. L.** 1974a. The cultural ecology of general versus dental health. In: *Bevolkerungsbiologie,* pp. 382-391. Stuttgart, Gustav Fischer.

Is dental health related to general health? This article answers in the negative. The evidence is based on 12 successive samples from the 7th millennium B.C. to modern times in the eastern Mediterranean, studied on 7 field trips between 1937 and 1969.

22. **Angel, J. L.** 1974b. Patterns of fractures from Neolithic to modern times. *Anthrop. Kozl.* 18:9-18.

Eleven samples, primarily from Greece and averaging about 60 skeletons each, cover the changes in civilization in the area from about 6,500 B.C. to the present, and are compared to to a modern American sample. Throughout this time, females have fewer fractures,

especially in the head and face. The incidence of vertebral fracture is similar in males and females. Pre-historic parry fractures of the ulna, head wounds, and fractures of the radius and hand are linked with combat; lower thoracic vertebral fractures are linked with stress. Fractures of the nose increase slightly in historic times and dominate in modern males, followed by fractures of the clavicle, radius, hand, tibia and (for males) skull, and (for females) pelvic fractures. It is concluded that up to modern times, the frequency of fracture is correlated inversely with urbanization.

23. **Angel, J. L.** 1976. Appendix: Early Bronze Karatas people and their cemeteries. *Am. J. Archeol.* 80:385-391.

In this supplement, which concentrates on the problem of how to correct for missing demographic data, brief mention is made of several instances of cranial trauma. Size, shape and grave goods contents of *pithoi* (earthenware jar coffins) are used for inferences as to the age and sex of individuals whose skeletons have disintegrated.

24. **Angel, J. L.** 1979. Osteoarthritis in prehistoric Turkey and medieval Byzantium. *Henry Ford Hosp. Med. J.* 27:38-43.

The incidence of osteoarthritis in this geographic area was found to be stable from antiquity to the present. No consistent sexual pattern was seen in the ancient material, although Turkish men in more recent populations have more osteoarthritis.

25. **Anon.** 1968. Discovery of prehistoric cemetery reveals Ohio Indians with arthritis and bad teeth. *J.A.D.A.* 77:792-793.

This brief report records the initial observations on 250 skeletons from a midwestern burial ground dated ca. 850 A.D. Abnormalities include a high incidence of arthritis, chronic bone infections, several bone tumors, healed fractures, and severe dental disease. The authors feel that the association of dental abscesses, caries and peridontal disease with a high protein diet is unusual, but offer no explanation for these unexpected findings.

26. **Anon.** 1973. How to X-ray your mummy. *Pract. Radiol.* 1:32-37.

A 2,500 year old Egyptian mummy in a museum in Pennsylvania was radiographed. It proved to be that of an elderly woman who had degenerative joint disease and a fracture of the right hip. The X-ray technique is described briefly.

27. **Anon.** 1974a. Negev Desert lung. *Br. Med. J.* 4:614.

The editor suggests we should not pass off sand pneumoconiosis as innocuous, or comment on its non clinical status, until more definitive studies such as pulmonary function studies, etc. have been performed (see Tapp et al., 1975).

28. **Anon.** 1974b. The mummy autopsy report. *Bull. Acad. Med. Toronto* 48:23-26.

A description of the autopsy of the mummy ROM-1 in August, 1974 (see Hart et al., 1977).

29. **Anon.** 1975 Industrial X-ray exposes mummies' secrets. *Rock. Inter. News* 3(16):3.

This brief news item summarizes the radiologic examination of three mummies in the collection of the Los Angeles County Museum and reports an earlier study of two mummies: that of an 18 month old decapitated Peruvian child in a mummy bundle (see Walter, 1974), and that of a Ptolemaic Egyptian mummy, showing calcific atherosclerosis of the feet, possibly associated with diabetes mellitus.

30. **Arensburg, B., Nothas, H. and Ziv, M.** 1977. Malleus fixed (ossified) to the tegmen tympani in an ancient skeleton in Israel. *Ann. Otol. Rhino. Laryng.* 86:75-79.

A 1,600 year old skull showed fusion of the malleus to the roof of the middle ear. In modern cases the change is due to trauma or infection, but the authors refrain from a specific diagnosis in this ancient case.

31. **Armelagos, G. J.** 1967. Future work in paleopathology. In Wade, 1967, pp. 1-8.

This article serves as a useful index of accomplishments in paleopathology since the mid-1960s. Armelagos suggested: the development of a central registry for the recording of specimens, establishment of a collection of known pathologic material for comparative purposes, extension of medical indexing to include paleopathology, closer cooperation between medicine and anthropology, the development of new standards of diagnosis, workshop for demonstrating techniques and the application of paleoepidemiologic approaches to paleopathologic studies.

32. **Armelagos, G. J.** 1969. Disease in ancient Nubia. *Science* 163:255-259.

A study of the paleopathology of the Meroitic, X-group and Christian populations of lower Nubia revealed decorative scarification, tattooing, pierced ears, and infestation with head lice.

33. **Armelagos, G. J., Mielke, J. H. and Winter, J.** 1971. *Bibliography of human paleopathology, research report No. 8.* Amherst, Mass., University of Massachusetts Department of Anthropology.

This comprehensive bibliography of approximately 2,000 entries is international in scope. A brief six page introduction dealing with the history and present state of paleopathology suggests possible avenues of research. The work is arranged alphabetically, without index or topical arrangement.

34. **Arnaud, G. and Arnaud, S.** 1975. Luxation congénitale bilatérale de la hanche et manifestations d'hyperostose porotique sur un squelette d'époque paléochrétienne. *Bull. et Mem. de la Soc. d'Anthrop. de Paris.* 2:307-326.

Complete measurements of an early Christian woman's burial are given. This adult had bilateral congenital hip dislocation and porotic hyperostosis, attributed either to thalassemia minor or to constitutional hemolytic anemia.

35. **Arnaud, G. and Arnaud, S.** 1976. Un nouveau cas d'amincissement biparietal symétrique. *Bull. Soc. Anthrop. de Paris* 1:3-14.

This elaborate presentation of a case of biparietal thinning of the skull includes a discussion of etiologic hypotheses and an excellent bibliography.

36. **Artamonov, M. L.** 1965. Frozen tombs of the Scythians. *Sci. Amer.* 212(5):101-109.

The embalmed frozen body of a Scythian chief was covered with tattoos of animals. His head was scalped and crushed, suggesting death in battle. The body had been eviscerated during embalming.

37. **Ascenzi, A.** 1970. Microscopy and prehistoric bone. In: *Science in Archeology,* eds. D. Brothwell and E. Higgs, pp. 526-538. New York, Praeger.

An excellent review of the use of the light and electron microscope in the examination of pre-historic bone, especially the process of fossilization. 103 references.

38. **Ascenzi, A. and Balistreri, P.** 1975. Aural exostoses in a Roman skull excavated at the "Baths of the Swimmer" in the ancient town of Ostia. *J. Hum. Evol.* 4:579-584.

A 4th century Roman skull showed bilateral aural exostoses. The possible relationship between the lesion and swimming is discussed.

39. **Ascenzi, A. and Balistreri, P.** 1977. Porotic hyperostosis and the problem of origin of thalassemia in Italy. *J. Hum. Evol.* 6:595-604.

This study examines 227 skeletal remains found in Lucania, a region of Italy colonized by Greeks. The conclusion is drawn that all the skeletal remains showing porotic hyperostosis to date in Italy are inadequate for an explanation of the problem of the origin of thalassemia in that country. Methodologies for use in future studies are suggested.

40. **Ascenzi, A. and Segre, A.** 1971. A new Neanderthal child mandible from an upper Pleistocene site in southern Italy. *Nature* 233:280-283.

Examination of the mandible of a 5-6 year old Neanderthal child revealed taurodontism of the molar teeth.

41. **Ashworth, J. T., Jr., Allison, M. J., Gerszten, E. et al.** 1976. The pubic scars of gestation and parturition in a group of pre-Columbian and colonial Peruvian mummies. *Am. J. Phys. Anthrop.* 45:85-90.

In 86 pre-Columbian and colonial Peruvian mummies the os pubis was examined for inflammation (osteitis pubis). This lesion, related to pregnancy, was found in 72.3% of pre-Columbian and 57.6% of colonial Peruvian females. 4 of the colonial women were buried with newborn children and one had a 4-month-old fetus in utero. The applications of this type of study are discussed, but no explanation was offered for the differences noted.

42. **Aspock, H., Barth, F. E., Flamm, H. et al.** 1973. Erkrangungen des Verdauungstraktes bei prähistorischen Bergleuten von Hallstatt und Hallein (Österreich). *Mitt. Anthrop. Gesell. in Wien* 103:41-47.(Parasitic infestations of the gastrointestinal tract in prehistoric miners of Hallstatt and Hallein, Austria.)

This paper treats the same subject as entry 43, but has excellent photographs and goes into greater detail on sociological aspects such as the poor hygiene, the route of infection, and the living conditions of miners at that time.

43. **Aspock, H., Flamm, H. and Picher, O.** 1973. Darmparasiten in menschlichen Exkrementen aus prähistorischen Salzbergwerken der Hallstatt-Kultur (800-350 v. Chr.). *Zbl. Bakt. Hyg.* 223:549-558. (Intestinal parasites in human excrement from prehistoric salt mines of the Hallstatt period — 800-350 B.C.)

In the prehistoric salt mines of this area, human excrement embedded in the salt mineral was found to contain the ova of *Trichuris trichiura* (10 of 13 samples) and *T. trichiura* and *Ascaris lumbricoides* (1/13). The large number of ova found suggests that symptoms were severe. Special techniques for the isolation of ova are described and involve repeated (X10) suspension and centrifugation of the feces in n/10 NaOH. The ova were in good condition and easily identified.

B

44. **Bander, M. S., ed.** 1970. Dr. Warren's postmortem. *Mass. Gen. Hosp. News* 29(10):2-3. Cf. also p. 8 *ibid.*

A description of the unwrapping and external examinations first began about 1824 of an Egyptian mummy, identified as Paddy Hershef, of the 26th Dynasty (662-525 B.C.).

45. **Bard, C. L.** 1930. Medicine and surgery among the first Californians. *Tour. Top.* 22:20-30.

This article is a reprint of a rare booklet published in 1894, consisting of a paper read by Dr. Bard upon his retirement as president of the Southern California Medical Society. It discusses medical and health practices among California Indians from prehistoric times to the end of the 19th century. Numerous medicines are mentioned. Other therapeutic methods cited include the treatment of rheumatism by placing the patient on an anthill until he was well bitten.

46. **Barraco, R. A.** 1978. Preservation of proteins in mummified tissues. *Am. J. Phys. Anthrop.* 48:487-492.

Tissues from several Egyptian mummies and an Eskimo mummy were analyzed biochemically. Protein was found to have undergone marked degradation, although the process was retarded in natronized tissues, as studied by atomic absorption spectrophotometry of cations in tissues.

47. **Barraco, R. A., Reyman, T. A., and Cockburn, T. A.** 1977. Paleobiochemical analysis of an Egyptian mummy. *J. Hum. Evol.* 6:533-546.

The fact that amino acids can be recovered from fossils hundreds of millions of years old has been known since the 1950s. This paper shows that protein molecules on the order of 130,000 daltons can be recovered from mummified tissues more than 2,000 years old. The size of the molecules approximates that of gamma globulin, and this gives hope of extracting all kinds of substances, including lipoproteins and hemoglobins. Sophisticated techniques are described, among them gel filtration, protein and carbohydrate assays, amino acid analysis, electrophoresis, thin layer chromatography and atomic absorption spectrophotometry.

48. **Barrow, M. V., Niswander, J. D. and Fortune, R.** 1972. *Health and disease of American Indians north of Mexico: a bibliography, 1800-1969.* Gainesville, Univ. of Fla. Press.

There are 1483 items divided into 22 categories, with further subdivisions. The 65 paleopathology entries include 13 not listed by Armelagos et al. (1971) or Crain (1971). There are author, subject and tribal indices.

49. **Bar-Ziv, J. and Goldberg, G. M.** 1974. Simple siliceous pneumoconiosis in Negev Bedouins. *Arch. Environ. Health* 29:121-126.

Silica with varying degrees of fibrosis was found in the lungs of 46 of 54 Bedouin tribesmen and women. The authors suggest that the source was sand inhaled during desert storms, and that because the sand was "old" it induced little fibrosis and was of little clinical significance. Other studies of desert dwellers are cited in support of this opinion. Similar changes have been seen in a number of Egyptian mummies (see Tapp et al., 1975).

50. **Bass, W. M., Gregg, J. B. and Provost, P. E.** 1974. Ankylosing spondylitis (Marie-Strumpell disease) in prehistoric northern Plains Indians. *Plains Anthrop.* 18:303-305.

Sporadic reports of ankylosing spondylitis have appeared in the paleopathologic literature, but there had been little opportunity to identify and study this process in large, well documented populations of all ages and both sexes. In this study of over 2,600 Indian burials from the Dakotas (over 1,400 adults) representing several periods but definitely of Arikara origin, only one individual (0.07%) was found to have ankylosing spondylitis. This incidence compares closely with that found in modern England (0.05%).

51. **Behar, M.** 1968. Food and nutrition of the Maya before the conquest and at the present time. In: *Biomedical challenges presented by the American Indian,* pp. 114-119. Washington, D.C., Pan American Health Organization.

An analysis of the dietary pattern and nutritional condition of pre-Columbian Mayans and of modern Mayans indicated that the earlier Mayans were probably better adapted to ecological conditions, even though corn was the main staple for both groups. The earlier group benefited from the availability of game, greater availability of land for cultivation, the absence of competing markets, prolonged breast feeding of infants and a lack of industrialized products. The deleterious sociocultural and economic changes that have taken place since the Conquest have damaged the diet of the modern Indians and have produced serious nutritional problems, particularly protein deficiency in small children.

52. **Benitez, J. T. and Lynn, G. E.** 1975. Temporal bone studies: findings with undecalcified sections in a 2,600 year old Egyptian mummy. *J. Laryng. Otol.* 89:593-599.

The superior portions of the petrous bones of mummy PUM-II were studied, an analogous specimen from a modern cadaver being used as a control. Light microscopy showed excellent preservation of Haversian systems and vascular channels. Osteoid seams and osteoblastic activity were seen. There was low turnover of bone with no evidence of osseous disease. Resin had penetrated into the mummified bone and apparently had acted as a fixative in preserving the bone cells and related elements. The excellent color photographs include one of a perforated eardrum, apparently caused by middle ear disease. This is the earliest record of that condition.

53. **Bennett, K. A.** 1972. Lumbo-sacral malformations and spina bifida occulta in a group of proto-historic Modoc Indians. *Am. J. Phys. Anthrop.* 36:435-440.

An unusually high frequency of a complex lumbo-sacral malformation is reported. The complex included varying stages of fusion of a sacralized 6th lumbar vertebra, neural arch defect of L6, greatly enlarged fossae for the attachment of the short posterior sacroiliac ligament, and pronounced differences in the length of the sacral hiatus. It is suggested that inbreeding might be partially responsible for the high frequency of the complex.

54. **Berg, E.** 1972. Paleopathology: bone lesions in ancient peoples. *Clin. Orthop. Rel. Res.* 82:263-267.

A report of 4 cases of bone diseases from the Chancay civilization of Peru, A.D. 400-1,600, including a possible slipped femoral capital epiphysis, vertebral compression fracture with fusion simulating ankylosing spondylitis, and two instances of pseudopathology.

55. **Beute, G. H.** 1979. Arthritis: a radiologic overview. *Henry Ford Hosp. Med. J.* 27:24-31.

The radiologic changes seen in a variety of arthritic changes are reviewed. Of paleopathologic interest is a mention of the diagnosis of ochronosis in an Egyptian mummy (see Lee and Stenn, 1978).

56. **Bietak, M. and Strouhal, E.** 1974. Die Todesumstande des Pharaos Seqenenre' (17.Dynastie). *Ann. Naturhistor. Mus. Wien* 78:29-52. (The circumstances of Pharaoh Seqenre's death).

An attempt is made to relate the head wounds of the mummy of Seqenre, in the Cairo Museum, to the weapons of Syro-Palestinian type found in the Eastern Delta. Previous examinations of the mummy, archeological studies, and a detailed discussion of the current examination are given. The article is illustrated with drawings and photographs of the head and wounds of the mummy, and of Syro-Palestinian bronze age weapons. Weapon types and wounds are juxtaposed for comparison.

57. **Birkby, W. H. and Gregg, J. B.** 1975. Otosclerotic stapedial footplate fixation in an 18th century burial. *Am. J. Phys. Anthrop.* 42:81-84.

A 200 year old skeleton of a Spaniard buried in the Tucson Pueblo showed fixation of the

footplate of the stapes by otosclerosis. This disease was not found in the examination of the skeletons of 2,600 American Indians of the same period, over half of whom had middle ear and mastoid disease. This study demonstrates that stapedial footplate fixation, which causes deafness, is preserved in the skeleton and was a rare disease in prehistoric American Indians.

58. **Bluhm, G. B.** 1979. Gout and pseudogout. *Henry Ford Hosp. Med. J.* 27:14-17.

The paleopathology, history and clinicopathologic features of these disorders are reviewed.

59. **Bohrer, S. P. and Connah, G. E.** 1971. Pathology in 700 year old Nigerian bones. *Radiology* 98:581-584.

Radiologic examination of 700-year-old skeletal remains revealed two sclerotic bone lesions. Endocortical thickening of the femur was thought to be due to adult sickle cell disease. The second lesion, diagnosed as a juxtacortical infarct, may also have been the result of a hemoglobinopathy.

60. **Bonzom, Y.** 1976. Pathologie de quelques populations anciennes de Basse Normandie. M.D. thesis, Université de Caen. (Pathology of certain ancient populations from lower Normandy).

This work reports on 304 skeletons from the 6th-8th centuries. Most of the pathologic changes consisted of congenital malformations, chiefly hip subluxations. Traumatic lesions were rare, the only skull fracture clearly being the result of a violent blow. Other fractures were found in the long bones, all healed in correct position. A reduced shoulder dislocation was also found. Other processes included Pott's disease, possible syphilis, and a high incidence of degenerative joint disease, most commonly affecting the lower limbs, perhaps as evidence of a sedentary or prolonged life. The severity and incidence of spondylosis was similar to that in modern populations. Two cases of trephination are reported.

61. **Bourque, J. and Morris, K.** 1978. Determining the season of death of mammal teeth from archeological sites: a new sectioning technique. *Science* 199:530-531.

The technique of epoxy plastic embedding described in detail in this paper may be of interest to those working with teeth in paleonutritional and growth studies.

62. **Brezinova, D. and Hurda, B.** 1976. Xylotomic examination of timber from ancient Egyptian coffins. *Z. Aegypt. Spr. u. Alt.* 103:139-142.

The wood used in ancient Egyptian coffins was found to be mostly native Egyptian timber, with only a few made from Lebanon cedar. This conclusion corresponds to old literary sources such as Herodotus and Strabo.

63. **Brier, B. and Bennett, M. L. V.** 1977. Autopsy of an Egyptian fish mummy. *PLA Rep.* 5:8-11.

Autopsies of Egyptian animal mummies are rare. This catfish mummy had unfortunately suffered considerable insect damage. The wrappings suggest the Middle Kingdom. The fish was packed with sand and only the swim bladder was identified.

64. **Brooks, S. T. and Melbye, J.** 1967. Skeletal lesions suggestive of pre-Columbian multiple myeloma in a burial from the Kane Mounds near St. Louis, Missouri, See Wade, 1967, pp. 23-29.

A case of possible multiple myeloma in a 40-year-old female is described. Comparison of photographs and X-rays of this specimen with known modern cases revealed a striking resemblance in the distribution of the classic "punched out" lesions. Possible pathologic fractures of both humeri and the femur were noted, a rare modern complication of multiple myeloma. Reexamination of two other recorded cases of this disease seemed to confirm the presence of multiple myeloma in pre-Columbian America.

65. **Brothwell, D. R.** 1972. *Digging up bones.* London, British Museum (Natl. Hist.).

This manual for archeologists contains a chapter which reviews reports of skeletal paleopathology.

66. **Brothwell, D. R.** 1974. Osteological evidence of the use of a surgical modiolus in a Romano-British population: an aspect of primitive technology. *J. Archeol. Sci.* 1:209-211.

A possible female skull from one of the Roman cemeteries in York shows a trephination in the region of the left mastoid that is indicative of a drilling technique. The types of instruments that could have been used are described and pictured.

67. **Brothwell, D. R.** 1976. Further evidence of treponematosis in a pre-European population from Oceania. *Bull. Hist. Med.* 50:435-442.

Of 169 16th century burials on Sarawak, 2% showed lesions of periostitis and osteitis consistent with a treponemal infection. While a specific diagnosis was not possible, the author reluctantly suggests yaws, on the basis of the modern prevalence of yaws in the area.

68. **Brothwell, D. R. and Burleigh, R.** 1975. Radiocarbon dates and the history of treponematoses in man. *J. Archeol. Sci.* 2:393-396.

Five radiocarbon dates on human skeletal material from North America were determined using collagen from the femora. The material comes from four archeological sites, three of which have individuals with pathologic changes suggestive of treponemal infection, and all, with one possible exception, pre-Columbian. These findings tend to support the hypothesis that one or another of the bone modifying treponematoses was present in late pre-Columbian Indian populations.

69. **Brothwell, D. R. and Chiarelli, B., eds.** 1973. *Population biology of the ancient Egyptians.* New York, Academic Press.

This book contains the proceedings of a symposium held in Turin in 1969 and many of the articles were initially printed in the *J. Hum. Evol.,* Vols. 1 and 2, 1972. A wide variety of problems in the physical anthropology, paleopathology, dental anthropology and ecology of the ancient Egyptians was covered. Of particular interest are chapters by Sandison and Satinoff on paleopathology.

70. **Brothwell, D. R. and Sandison, A. T., eds.** 1967. *Diseases in antiquity: a survey of the diseases, injuries and surgery of early populations.* Springfield, Ill., C. C. Thomas.

This now-classic book contains a number of original and reprinted articles which thoroughly cover the field and accurately predict directions of future research. Many of the chapters, particularly Calvin Wells's on pseudopathology, remain of current interest.

71. **Brothwell, D. R., Sandison, A. T. and Gray, P. H. K.** 1969. Human biological observations on a Guanche mummy with anthracosis. *Am. J. Phys. Anthrop.* 30:333-347.

A radiologic and pathologic examination of a mummy from the Canary Islands revealed multiple fractures, possibly antemortem, and pulmonary anthracosis. The general degree of preservation was not as good as in Egyptian mummies.

72. **Bucaille, M.** 1977. Les momies pharaoniques et la médecine. Ramses II à Paris. *Med. et Hyg.* 35:2422-2430. (The pharaonic mummies and medicine. Ramses II in Paris).

Some of the royal mummies in the Cairo Museum were found to be riddled with fungi and slowly being destroyed. Photographs show the fungal colonies on the face and neck of Amenophis II and on the embalmer's incision of Ramses II. This work led to the treatment of the latter by radiation in Paris.

73. **Bucaille, M., Ceccaldi, P., Durigon, M. et al.** 1976. Application de techniques médicales a l'étude des momies pharaoniques. *Bull. Acad. Natl. Med.* 160:208-212. (Application of medical techniques to the study of the pharaonic mummies).

The application of medical techniques to mummy studies is reviewed briefly. Except for endoscopy (see Manialawiy, 1978), most of the methods are familiar to workers in this field.

74. **Bucaille, M., Kassem, K., Meligiy, R. L. et al.** 1976. Intérêt actuel de l'étude radiologique des momies pharaoniques. *Ann. Radiol.* 19:475-480. (Radiology of the pharaonic mummies).

A study of the radiology of certain royal mummies in the Cairo Museum. The reports of this team on the biodegradation of the mummies led to flying Ramses II to Paris for radiation treatment in order to eradicate the fungal and other infections.

75. **Buchwald, H., Moore, R. B. and Varco, R. L.** 1974. A surgical treatment of hyperlipidemia. Circulation 49(5, suppl. 1):1-37.

The article is of interest to paleopathologists for its fine summary of the history of atherosclerosis. Beginning with Leonardo da Vinci, who was the first to describe the condition (he followed a 100-year-old man to his death and then did a secret autopsy), progressing to Vogel, who first showed cholesterol in an atherosclerotic placque, the story is continued to the present. Elliot Smith first demonstrated the condition in antiquity in the mummy of the Pharaoh Mernaptah. Then followed Ruffer's demonstration of the prevalence of the

condition in mummies. In modern times, atherosclerosis was found in 45% of young men dying in Viet Nam.

76. **Budge, E. A. W.** 1972. *The mummy.* New York:Collier.

This book contains a discussion of the changes through time in Egyptian mummification techniques and of the associated grave goods and hieroglyphics. The information is primarily of use in archeologic correlations.

77. **Buikstra, J. E.** 1976a. Differential diagnosis: an epidemiological model. *Yearbook Phys. Anthrop.* 19:316-328.

Pre-Columbian tuberculosis has been a matter of contention for decades. The presence of kyphotic and ankylosed vertebrae in prehistoric America has been well documented, but the exact diagnosis has been a problem. The author proposes an epidemiologic model for attacking the problem, using data from a cemetery in Illinois to illustrate her procedures. The point is made that the variable expression of skeletal pathology in a total series should be investigated, including the local ecological setting.

78. **Buikstra, J. E.** 1976b. The Caribou Eskimo: general and specific disease. *Am. J. Phys. Anthrop.* 45:351-368.

Harris lines and probably tuberculous lesions are presented for a small sample (n=28) of postcontact Caribou Eskimo skeletons from several sites just west of Hudson Bay. Periodic patterning of Harris lines suggested a recurrent annual stress cycle, perhaps related to late winter famine. Resorptive lesions, primarily vertebral, were examined for form, distribution and epidemiologic information. The best fitting model is tuberculosis. A major value of this study is the detailed presentation of the differential diagnosis of the resorptive process.

79. **Burns, P. E.** 1979. Log-linear analysis of dental caries occurrence in four skeletal series. *Am. J. Phys. Anthrop.* 51:637-648.

Samples from Greece, New Mexico, Nubia, and England were analyzed for sex, jaw (upper or lower), dental pathology, site, and time period, with the formulation of a statistical model. Caries was found to be positively associated with females, maxillae, and heavy attrition. Much detailed information is presented.

C

80. **Calder, A. M.** 1977. Survival properties of organic residues through the human digestive tract. *J. Archeol. Sci.* 4:141-151.

A short program of practical research was designed to test the survival properties of a select few foodstuffs which occurred often in the prehistoric Maori diet. Food items were consumed with a fecal marker and relevant stools were collected and treated with trisodium phosphate solution (0.4% w/v). Pertinent items were isolated from the stool by flotation techniques and were identified microscopically. The results demonstrate the probable value of further work on this subject.

81. **Calder, J. and Calder, A.** 1977. Talo-calcaneal bridging in an Anglo-Saxon. *Med. Hist.* 21:316-319.

A partial skeleton from a 1,300 year old site showed fusion of the right talus and calcaneus. This genetic anomaly results in the syndrome of "peroneal spastic flat foot." The literature is reviewed.

82. **Callen, E. O. and Cameron, T. W. M.** 1960. A prehistoric diet revealed in coprolites. *New Scientist* 8:35-37, 39-40.

Sodium triphosphate was used to reconstitute a large number of coprolites obtained from a kitchen midden mound at Huaca Prieta on the Peruvian coast. The dates were 3,000-500 B.C. The diet of the inhabitants was determined by the examination of plant and animal remains in the feces. All coprolites were devoid of parasites except for one possible fish tapeworm. Various species of *Diphyllobothrium* are known to occur in South America at present.

83. **Callen, E. O. and Cameron, T. W. M.** 1955. The diet and parasites of prehistoric Huaca Prieta Indians as determined by dried coprolites. *Proc. R. Soc. Can.* 5:51-52, (June 7).

A preliminary note on the work described in entry 82.

84. **Carlson, D. S., Armelagos, G. J. and Van Gerven, D. P.** 1974. Factors influencing the etiology of cribra orbitalia in prehistoric Nubia. *J. Hum. Evol.* 3:405-410.

Examination of the distribution of cribra orbitalia in 285 crania from Meroitic, X-Group, and Christian cultural horizons in ancient Nubia revealed a concentration of lesions among infants and the elderly. Specific environmental circumstances are unfavorable to the hypothesis of congenital hemolytic anemia as the causal factor. High levels of intestinal parasitism, iron deficient diet, diarrhea of weanlings, and multiparity are thought to lead to chronic iron deficiency anemia, and subsequent formation of cribra orbitalia. Contemporary clinical observations support this interpretation.

85. **Cartwright, F. F.** 1972. *Disease and history.* New York: Crowell.

An excellent book giving a compact account of a range of diseases from antiquity to modern times. It is good background reading for beginners in paleopathology, since it gives descriptions of plague, the early history of such diseases as syphilis, smallpox, and malaria, as well as typhus and tropical infection in recent centuries.

86. **Cassidy, C. M.** 1977. Probable malignancy in a Sadlermiut Eskimo mandible. *Am. J. Phys. Anthrop.* 46:291-296.

This woman, about 30 years old at death, had over 300 well formed foramina in her mandible, concentrated bilaterally around the mental foramina. A probable diagnosis of metastatic carcinoma was made, with the differential diagnosis including sarcoma, hyperparathyroidism, hemangioma and osteomyelitis.

87. **Cassidy, C. M.** 1979. Arthritis in dry bones: diagnostic problems. *Henry Ford Hosp. Med. J.* 27:68-69.

The diagnostic problems of arthritis in skeletal material are reviewed. The importance of the degree of preservation is stressed.

88. **Cejka, J., Fydrych, M., Kapralova, E. et al.** 1976. Contribution to the chemical research on Egyptian mummies. *Z. Aegypt. Spr. u. Alt.* 103:128-139.

Various inorganic materials, including desiccants, were found in mummies. Resin was noticed but not analyzed.

89. **Chapman, F. H.** 1962. Incidence of arthritis in a prehistoric Middle Mississippian Indian population. *Proc. Ind. Acad. Sci.* 72:59-62.

See entry 94.

90. **Chapman, F. H.** 1964. The incidence and age distribution of osteoarthritis in an archaic American Indian population. *Proc. Ind. Acad. Sci.* 72:64-66.

See entry 94.

91. **Chapman, F. H.** 1968a. Comparison of osteoarthritis in three aboriginal populations. *Proc. Ind. Acad. Sci.* 74:84-86.

See entry 94.

92. **Chapman, F. H.** 1968b. Geographical survey of the incidence of osteophytosis in Indian populations in aboriginal America. Verhandlungen des XXXVIII Internationalen Amerikanistenkongresses, Stuttgart-München, 12-18 Aug.

See entry 94.

93. **Chapman, F. H.** 1972. Vertebral osteophytosis in prehistoric populations of central and southern Mexico. *Am. J. Phys. Anthrop.* 36:31-38.

See entry 94.

94. **Chapman, F. H.** 1973. Osteophytosis in prehistoric Brazilian populations. *Man* 8:93-99.

This is the last in a series of six papers covering 11 years of study in the New World and dealing with the incidence of vertebral osteoarthritis in several ancient populations. The populations dated from 7,000 B.C. to 1,500 A.D.; the individuals were in the second to eighth decades of life. Osteophystosis was found to have begun relatively early, sometimes in the teens, and to have become steadily more common and severe in advancing years. Sexual differences were less apparent. All the groups depended on hunting, fishing, and agriculture for survival. The author implies that a heavy work load probably accounts for the high incidence of the disorder in these groups, although other causes are considered.

95. **Chapman, F. H.** Dental paleopathology in Florianopolis, Brazil. *Yearbook Phys. Anthrop.* 19:347-348.

Information is given about people who lived on a beach between A.D. 1,000 and 1,500. 150 graves contained 72 children and 82 adults. Infant mortality was high. Four females died in childbirth and five males met violent deaths. Dental abrasion was heavy, and nine adults had abscessed teeth. Six adults had auditory exostoses.

96. **Chiarelli, B., Fuhrman, A. C. and Massa, E. R.** 1970-1971. Nota preliminare sulla ultrastruttura dei capelli di mummia egiziana al microscopio elettronico a scansione. *Riv. di Antrop.* 57:275-278.

In studies made by means of scanning electron microscopy, it was found that human hairs of different chronological ages could provide indications of the changes which these structures underwent with time.

97. **Chiarelli, B. and Massa, E. R.** 1967. La conservazione dei tessuti nelle mummie egiziane. *Riv. di Antrop.* 54:167-170.

Histological studies of scalp material from 14 Egyptian mummies. Red blood cells were thought to be preserved in at least half of the specimens.

98. **Christy, C. G. II.** 1978. Dental caries and early Ecuadorean agriculture. *Am. Antiq.* 43:694-697.

To test earlier suggestions of intensive agriculture in coastal Ecuador ca. 2,000 B.C., a collection of human skeletons in the U.S. National Museum from two Ecuadorean sites was examined for dental caries. A lack of significant caries was judged as failing to support the hypothesis of early intensive agriculture in Ecuador.

99. **Clabeaux, M. S.** 1969. Problems in the use of paleopathologic data in the interpretation of behavior in archeologic populations. *Trans. N. Y. Acad. Sci.* 31:850-854.

This general review is concerned mostly with the limitations in the paleopathologic data base and the interactions between culture and pathology. The use of demographic information in the interpretation of biocultural relationships is stressed. Summary data from the Orchid site (a pre-Iroquois ossuary on the Niagara River in Ontario) illustrate the problems and the uses of paleopathology.

100. **Clabeaux, M. S.** 1976. Health and disease in the population of an Iroquois ossuary. *Yearbook Phys. Anthrop.* 19:359-370.

This is a study of an Iroquois ossuary, about a third of which was destroyed by bulldozers. The population numbered between 400 and 600. The difficulties in handling such a mixture of bones are great and there is little chance of recording individual histories. The people seem to have been healthy; there is little evidence of nutritional or congenital disease. Osteoarthritis affected about half, but in general the people were physically adapted to their rugged existence.

101. **Clabeaux, M. S.** 1977. Congenital dislocation of the hip in the prehistoric northeast. *Bull. N.Y. Acad. Med.* 53:338-345.

Three new cases of this disorder are presented. The etiology and possible pathogenesis are reviewed. A high incidence is noted in modern native American populations; this study indicates that the disease is not new to this group.

102. **Clark, G. A. and Delmond, J. A.** 1979. Vertebral osteophytosis in Dickson Mound populations: a biomechanical interpretation. *Henry Ford Hosp. Med. J.* 27:54-59.

Skeletal material from the Dickson Mounds, Illinois, covers a period from 900 to 1,300 A.D. Differences were demonstrated in the pattern of arthritis seen in the three different cultural horizons represented by the Dickson Mound remains.

103. **Clarke, S.** 1977. Mortality trends in prehistoric populations. *Hum. Biol.* 49:181-186.

Mortality profiles were constructed for five populations from Dickson Mounds (Illinois), Meinarti (Sudanese Nubia), and Point of Pines (Arizona). All populations showed increased mortality rates for the periods 2-6 years and 20-30 years. Post- weanling nutritional stress and childbearing stress (plus mortality related to hunting and warfare) are proposed as explanations for the two age groups respectively.

104. **Clausen, C. J., Cohen, A. D., Emiliani, C. et al.** 1979. Little Salt Spring, Florida: a unique underwater site. *Science* 203:609-614.

An underwater site contained artefacts and other evidence of paleo-Indian origin dating up to 12,000 years ago. Of paleopathologic interest was human skeletal material and partly preserved brain tissue 6,000 years old. Preservation was attributed to an anaerobic environment.

105. **Cockburn, E., ed.** 1973a. *Paleopathology Newsletter No. 1* (1973). Detroit: Paleopathology Association.

The quarterly publication of the Paleopathology Association (18655 Parkside, Detroit, MI 48221) covers current news in the field and reviews current literature. Original articles and an annual monograph are included.

106. **Cockburn, E.** 1973b. Autopsy team seeks a mummy's medical secrets. *Smithsonian* 4:80-89.

A non-technical account of the autopsy of mummy PUM-II. Eight large color photographs, including photographs of an intact cell, silicosis, and an insect larva, are included.

107. **Cockburn, T. A.** 1973. Death and disease in ancient Egypt. *Science* 181:470-471.

A brief review of the dissection of an Egyptian mummy (PUM-II) lent by the University of Pennsylvania. Papers presented at an accompanying symposium at Wayne State University are also reviewed. The papers cover a wide range of topics, and emphasize new directions in research. The need for a paleopathology association is stressed.

108. **Cockburn, T. A.** 1977. Where did our infectious diseases come from? The evolution of infectious disease. In: *Health and disease in tribal societies. Ciba Found. Symp.* 49. Holland: Elsevier.

A discussion of factors that may influence the evolution of infectious disease, including continental drift, primate evolution, the onset of agriculture, population growth, and urbanization. The concept of a minimum population size for maintenance of infectious disease is considered.

109. **Cockburn, T. A.** 1978. Paleopathology and its Association. *JAMA* 240:151-153.

The president of the Paleopathology Association reviews the history and goals of the organization. The eradication of disease is discussed from a historical perspective. The origin of viruses is also considered.

110. **Cockburn, T. A., Barraco, R. A., Reyman, T. A. et al.** 1975. Autopsy of an Egyptian mummy. *Science* 187:1155-1160.

This report summarizes the findings obtained by an interdisciplinary team which carried out research on mummy PUM-II. New observations were made on: silicosis, color changes associated with unwrapping and exposure to air, ascariasis (the first case from Egypt), earliest Egyptian cotton, recovery of intact protein (of molecular weight similar to that of gamma globulin), periostitis of unknown etiology, earliest report of perforated eardrum and identification of osteoid seams.

111. **Cockburn, T. A., Duncan, H. and Riddle, J. M.** 1979. Arthritis, ancient and modern: guidelines for field workers. *Henry Ford Hosp. Med. J.* 27:74-79.

This is a summary of a symposium held at the Henry Ford Hospital in 1978. Guidelines are offered for the diagnosis of the various arthritides in ancient remains.

112. **Comode, P.** 1975. Paléopathologie: l'Hypogée de Loisy-en-Brie. M.D. thesis, Dijon. (The Hypogaeum at Loisy-en-Brie).

This work deals with the skeletons removed from a late Neolithic grave, where 425 pathological items from 160 individuals were found. The 400 postcranial lesions are the topic of this report. Ninety-seven cases of congenital malformation or maldevelopment were identified. This high number (and especially 7 cases of congenital subluxation of the hip) leads Comode to believe that the population was endogamic. The few fractures that were seen were limited to the forearm.
Degenerative disease was found to involve the joints and vertebral column in a manner similar to the involvement in modern man. Few infectious lesions were found. There were two or three cases of possible tuberculosis. There was no evidence of malignancy. The only example of proliferating bone was a benign exostosis. Comode concludes that this population was sedentary and peaceful.

113. **Cook, D. C.** 1976. Pathologic states and disease processes in Illinois Woodland populations: an epidemiologic approach. Ph.D. thesis, University of Chicago.

Abstract unavailable.

114. **Cook, D. C.** 1979. Subsistence base and health in prehistoric Illinois Valley: evidence from the human skeleton. *Med. Anthrop.* 3:109-124.

The effects of the transition from hunting-gathering to agriculture in the first millennium A.D. are discussed in this study. Paleoepidemiologic and paleopathologic data are complementary in suggesting that population pressure is the factor which necessitates the adoption of agriculture.

115. **Cook, D. C. and Buikstra, J. E.** 1979. Health and differential survival in prehistoric populations: prenatal dental defects. *Am. J. Phys. Anthrop.* 51:649-664.

Examination of deciduous teeth from the skeletons of children of the middle and late Woodland in Illinois revealed enamel defects in about half of them. Circular caries seen in the late Woodland series was attributed to diet. The defects were associated with anemia, infectious disease, and malnutrition.

116. **Costa, R. L., Jr.** 1978. Dental pathology and related factors in archeological Eskimo skeletal samples from Point Hope and Kodiak Island, Alaska. Ph.D. thesis, University of Pennsylvania.

This study of caries, periodontal disease, and abnormal wear revealed the condition of the interdental septa to be a more reliable indicator of periodontal disease than alveolar resorption. The latter can be caused simply by heavy wear on the occlusal surfaces of the teeth. Caries was found to be associated negatively with age. Wear and abscesses were associated positively with wear related to periodontal disease.

117. **Cox, P. R. and Peel, J., eds.** 1972. *Population and pollution.* London: Academic Press.

Three papers in this volume consider the question of pollution in prehistory: G.W. Dimbleby deals with the effects of agriculture; D. Brothwell discusses the use of poisons as well as pollution from the standpoint of changes in diet, housing facilities and water utilization brought about by food production; and D.M. Dixon confronts environmental pollution resulting both from personal and communal habits and from industrial activities.

118. **Crain, J. B.** 1971. *Human paleopathology: a bibliographic list.* Sacramento: Sacramento State University Department of Anthropology.

A brief introduction covering aspects of the history, development, and problems of paleopathologic studies prefaces this bibliography of 1218 titles. Although not as complete as the bibliography by Armelagos et al. (1971), it does contain some items omitted from the latter.

119. **Curzon, M. E. J.** 1976-77. Dental disease in Eskimo skulls in British museums. *OSSA* 3/4:83-95.

The material for this study was collected by travellers to Greenland between 1818 and World War I. The 160 skulls examined were found in ten different institutions in the British Isles. Only 42 skulls were complete enough for analysis. Dental caries was found in six of the skulls, 83% showed periodontal disease; and 28% showed antemortem loss of teeth, mostly molars and incisors. The author assumes that loss of teeth was due to the high level of

periodontal disease. He concludes that periodontal disease was as common in the early as in the modern Eskimo, but that dental decay was less frequent before exposure to western civilization.

120. **Cybulski, J. S.** 1977. Cribra orbitalia, a possible sign of anemia in early historic native populations of the British Columbia coast. *Am. J. Phys. Anthrop.* 47:31-40.

A study of museum collections of skulls revealed a pattern of cribra orbitalia suggesting anemia, probably the result of iron deficiency. Postcontact disruptions may have promoted iron deficiency.

121. **Cybulski, J. S.** 1978a. Modified human bones and skulls from Prince Rupert Harbour, British Columbia. *Can. J. Archeol.* 2:15-32.

Twenty-five skulls and long bones, altered post mortem, are described from seven sites dating from 1,000 B.C. to 500 A.D. Most of these modified bones were non-utilitarian, and it is suggested that they were used in ritual practices, for which there is ethnographic evidence.

122. **Cybulski, J. S.** 1978b. *An earlier population of Hesquiat Harbour, British Columbia.* Victoria: Brit. Col. Prov. Mus.

This study of the Hesquiat Indians of British Columbia includes a brief discussion of the paleopathology of the skeletal remains of a population of the early 19th century. Skeletal lesions were few, and included examples of degenerative joint disease, trauma, infection, and hyperostosis.

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Memoir of Oscar V. Batson
1894-1979

PAUL NEMIR, JR., M.D.

LATE in the evening of November 11, 1979, Dr. Oscar Vivian Batson, distinguished anatomist, otolaryngologist, scientific investigator, master craftsman, and Fellow of the College of Physicians for 47 years, passed quietly away. On the evening prior to his death, he and his wife celebrated Dr. Batson's eighty-fifth birthday in the company of their dear friends, Professor and Mrs. James House.

Dr. Batson's grandparents came from Sweden to the United States and settled on a farm in Indiana. The family name of Boström became anglicized to Batson. Dr. Batson's father, John Peter, was born in Indiana, grew up on his father's farm, and married Mary Caroline Winter. Together, John Peter and Mary Caroline taught school in Indiana for several years and then moved to Sedalia, Missouri, in 1888. Six years later, on November 10, 1894, Oscar Vivian was born. He graduated first in his class from the Sedalia High School and in the Fall of 1912 entered the University of Missouri at Columbia.

A number of significant events occurred during the years at the University of Missouri. There, he came under the influence of Clarence M. Jackson and subsequently Eliot R. Clark, Professors of Anatomy, and he determined that he would become a professional anatomist. It was there that he began his night work and his night habits. Although the anatomy building was locked at night, he found a way to enter and began doing his dissections at nights and on Sundays and holidays. Under Professor Clark's supervision he mastered the technique of injecting chick embryos and this provided the basic methodology for the experimental work for his master's degree.

It was during this period that he determined to obtain the M.D. degree because he felt that since human anatomy was fundamentally a medical school subject, the teacher should know something about the whole field of medicine.

Two of his teachers at the University of Missouri were Herman Shlunt, Professor of Chemistry and Harvey Rentschler, Professor of Physics. It was under these men that his interest in radiology developed and this was to have great influence on his contributions and associations over the subsequent years. It was Professor Rentschler who first introduced him to the Coolidge Tube and allowed him to work with X-ray equipment.

Another very important event happened during this period. He met Eleanor H. Neumann at the University of Missouri in 1916, the year that he received his Baccalaureate and two years later they were married. He received his master's degree in 1918, also.

He took the last two years of medicine at St. Louis University and was granted an M.D. degree in 1920. While in St. Louis he worked with Dr. Leroy Santee and his interest in radiology and its application to anatomy was further stimulated and enhanced. He was one of the pioneers in stressing that anatomy and radiology were helpmates and he was probably the first to illustrate joint form and function with the X-ray plate and later with the fluoroscopic screen in his teachings.

After his graduation in 1920, he received two offers and the resolution of the dilemma was characteristic of his sense of priorities and of his humility. He wrote the following: "I had one offer from Poynter at Nebraska of an Assistant Professorship at $2500 and one from Bardeen at Wisconsin of a post of Instructor at $1800. I have decided to go to Wisconsin partly because of the better library, partly because of Bardeen, and partly because of the lesser title. I did have to borrow $50 in the Spring in order to go to the Anatomic Meetings in Philadelphia." At Wisconsin he went back to his night time dissecting hours, quiting shortly before midnight so as to get the last trolley car for home. Dr. Charles R. Bardeen, the Professor of Anatomy and Dean at Wisconsin exerted a great influence over Dr. Batson during these years and nurtured and stimulated his thought processes at their regular weekly meetings.

On a Saturday morning of the third week of June 1921 he received a telegram asking him to go to Cincinnati for an interview. He took the two o'clock train that afternoon, met with Professors H. M. Knower and Edgar F. Malone, returned to Wisconsin early Monday morning and made the decision to go to Cincinnati. Despite all that Dr. Bardeen could do to keep him, he left Wisconsin for Cincinnati and joined that faculty as Assistant Professor in the fall of 1921. He spent seven very productive years in Cincinnati. At the age of 32 he was given full rank and had the distinction of being the youngest Professor of Anatomy in the United States. During the Cincinnati years he maintained an even stronger relationship with his radiological colleagues and made fluoroscopic demonstrations and film studies an integral part of the course in Freshman Anatomy. It was during this time that he had occasion to meet Professor Arthur Schuler from Vienna who made a tremendous impression upon him and stimulated his interest in the venous system.

In 1933 Dr. Batson was asked to come to the University of Pennsylvania as Professor of Anatomy in the Graduate School of Medicine. One of the attractive things about coming to Philadelphia was that new X-ray equipment was being installed in the anatomy laboratory. He came here in 1933 as Professor of Anatomy and served in that position until his retirement from the Chairmanship in 1963, though his active participation in teaching and in research continued until several years before his death. In 1975 at the age of 82, he was an invited Chairman at the International Congress of Anatomy which convened in Tokyo.

Dr. Batson's major contributions relate to the vertebral system of veins.

Although previously described, the vertebral veins remained no more than a morphological curiosity and were considered of no clinical importance as late as 1940. It was about this time, after much trial and error, that Dr. Batson developed a satisfactory injection and corrosion technique which allowed him to visualize the vascular system as a complete unit. He was struck by the extent and complexity of the vertebral venous system which now appeared as a total entity in the same specimen. He noticed the similarity in the pattern of the vertebral and pelvic veins to the distribution of the metastatic lesions from carcinoma of the prostate. He clearly demonstrated the possibility of spread of malignancy through the vertebral venous system. By pursuing this line of investigation Dr. Batson worked out many of the problems of collateral circulation associated with superior and inferior vena caval obstruction and ligation in human cadavers and living monkeys. As a result of his investigations, elective ligations of the inferior vena cava became an accepted operative procedure.

Dr. Batson was, for many years, a practicing otolaryngologist and served in various clinical capacities at the Philadelphia General Hospital, Episcopal Hospital and Hospital of the University of Pennsylvania. He went into otolaryngology because of his special interest in the skull and the anatomy of the head. He was intrigued by the fact that the relations are fixed in the skull and therefore the X-ray film would be a particularly precise way of recording and studying those relationships.

His investigations by means of injection, corrosion and contrast roentgenology, provided logical answers for the occurrence of metastatic abscesses following certain forms of sepsis. Much of his work was concerned with the venous drainage of the pharynx with particular emphasis to tonsillar bleeding. His work on surgical relationships of the maxillary antrum led to advances in the control of severe intractable nasal bleeding. He illustrated and described the cricopharyngeus muscle, the constrictor at the upper end of the esophagus, and a structure of recent considerable prominence in the management of Zenker's Diverticulum. His fundamental contributions in these areas are integrated in many ways into clinical practice today.

Dr. Batson received many honors, including honorary doctoral degrees from the University of Missouri and the St. Louis University. He was the recipient of the American Roentgen Ray Society's Wilhelm Conrad Roentgen Medal, and in 1956 he delivered the Caldwell Lecture of the American Roentgen Ray Society and received the Caldwell Medal. He has received the Key of the American Academy of Ophthalmology and Otolaryngology and the AMA's Hektoen Gold Medal. Adept at graphic illustrations, his exhibits at the AMA and American Roentgen Ray Society won many awards. He served as Vice President of the American Association of Anatomists. He served as Secretary and later Chairman of the section on Otolaryngology of the College of Physicians of Philadelphia. The University of Pennsylvania Medical School's Class of 1945 dedicated their

yearbook to him. Because of his studies on the vertebral venous circulation, Dr. Batson is listed among the 225 pioneers in the two volume *Classic Descriptions in Diagnostic Roentgenology,* edited by Andre Johannes Bruwer and published in 1964. He is the only anatomist so listed. He was a member of many professional societies and served on the editorial board of the *American Journal of Roentgenology.* He was an Honorary Member of the Kansas City Surgical Society and an Honorary Life Member of the Philadelphia Roentgen Ray Society.

Dr. Batson is survived by his wife, Eleanor Neumann Batson, a son, Dr. A. Peter Batson, and two grandsons.

Dr. Batson took great delight in talking about his youthful years in Sedalia, Missouri, and more particularly about the newspaper, the *Sedalia Bazoo.* The motto on the masthead of the paper was "For Whoso Bloweth Not His Own Bazoo the Same Shall Not be Blown." Surely this was not true for Oscar Vivian Batson. The legendary wearer of the black string bow tie, thick crepe soled shoes, and great shaggy white mane will be sorely missed and long remembered.

Memoir of Lessing J. Rosenwald 1891-1979

JONATHAN E. RHOADS, M.D.

OUR distinguished honorary associate, Mr. Lessing J. Rosenwald, died on June 24, 1979 at the age of 88. His father was Julius Rosenwald, who built Sears, Roebuck and Company into the great marketing organization which it has become and Lessing Rosenwald's earlier years were devoted to persistent hard work at Sears. He handled the difficult and precarious journey of a boss's son so well that when his father died in 1932 he became Chairman of the Board of this great company. Indeed, he had moved to Philadelphia in October 1920 to construct the huge Sears branch on Roosevelt Boulevard and I recall making many bicycle journeys as a boy from our home in Germantown to witness this construction at various stages. The round trip was eleven miles.

In 1939 Mr. Rosenwald resigned his position with Sears to devote his principal effort to collecting. One perhaps does not gain the full implications of this without reading his book *Recollections of a Collector* which was printed in 1977. Here it is abundantly clear that collecting, in his view, was not a matter of amassing a miscellaneous series of expensive specimens but was a truly professional undertaking in which the collector seeks to define his areas of interest and to collect in such a manner that there are meaningful interrelationships between the antiquities which he assembles so that each throws a light on one or more of the others. Mr. Rosenwald's two fields were prints and drawings from the 14th century to date and old books, and these two fields reinforced each other strongly. Although he was devoted to his adopted city of Philadelphia, he designated his great collections for our national institutions, the Library of Congress for the books, and the National Gallery for the prints, and I think we must all agree that these are the locations in which Americans will have the broadest opportunities to use them and where they will have the greatest impact. The print collection alone exceeded 25,000 items and while most of the specific facts which Lessing Rosenwald carried about the various items in the collection are duly recorded, there can hardly be anyone who will be able to have so many of these facts present in his memory and his consciousness at the same time. This is, of course, the great tragedy of death.

Mr. Rosenwald was a very kind man, generous to a vast number of philanthropic activities, but he was an independent thinker, not much swayed by passing currents. He did not believe in endowments, believing as did his father before him that each generation should find the funds to carry on the things which they really believed were worthwhile. Indeed, when I discussed with him certain endowment possibilities in connection with one of Philadelphia's most

venerable institutions, he undertook to convince me of the errors in my thinking and was kind enough to send me articles written by his father in the *Atlantic Monthly* which expressed this view very forcibly.

Mr. Rosenwald gave not only of his substance for current projects but he gave freely of himself both to larger audiences and to small audiences. As examples I would cite his recent appearance on Channel 12 T.V. surrounded by rare books and a covey of young people. He came across as the delightful, warm human being which he was. As an example of the former, I would mention that he gave an evening to come after one of his journeys to a small Quaker group in Germantown, there to talk about his experiences and to describe his recent journey to the East. His remarks were carefully prepared, pertinent, informative and delightfully given.

Of his extraordinary wife, Edith, to whom he dedicates *Recollections of a Collector* he wrote, "by far the most important person in my life is Edith. Suffice it to say that whatever I may have accomplished is due to her strong impetus, her understanding and loving guidance." Due to her, he is survived by his two sons, his three daughters, nineteen grandchildren and so far twenty great-grandchildren.

He held honorary degrees from the University of Pennsylvania, Jefferson Medical College, LaSalle College, Lincoln University, Colby College, Williams College, Beaver College, The Philadelphia College of Art and awards from many other universities and institutions. He was a member of the American Council of Learned Societies, Philobiblon Club, the American Antiquarian Society, the Association Internationale De Bibliophile, the Royal Society of Arts in England, the American Philosophical Society and the Wistar Association. The latter organization composed as it is of 24 members of the American Philosophical Society, has only one officer, the Dean, and he occupied this position during the years 1966 through 1971. He and his wife were wonderful hosts and the Wistar parties which they hosted were delightful and memorable occasions.

His support of Philadelphia institutions included the Jefferson Hospital, Abington Memorial Hospital, the Rosenbach Foundation, the Community Chest of Philadelphia, the Free Library of Philadelphia, the Philadelphia Orchestra, the University of Pennsylvania, the Institute for Advanced Study in Princeton, the American Council for Judaism, the International Rescue Committee and, during the war years, he devoted himself to work with the War Production Board in Washington.

Lessing Rosenwald became an Honorary Associate of the College of Physicians of Philadelphia May 3, 1967. He shared with the College of Physicians a deep interest in historical publications and an extensive knowledge of books printed before 1500 and designated as incunabula. The two largest collections of such works in the country are held by the Library of Congress and the Huntingdon Library of Pasadena. Each has between 5000 and 6000. In the Philadelphia area,

Bryn Mawr College with 1000 or more incunabula is the largest holder, but the College of Physicians probably has the largest collection of medical incunabula with a list of 423.

The Trustees of the Philadelphia Award were indeed wise in bestowing the annual Bok Award on Lessing Rosenwald in 1967 and those of us in the College who had the privilege of knowing him will be forever grateful for the opportunity of sharing his company, his interests and the great kindliness which he always seemed to radiate.

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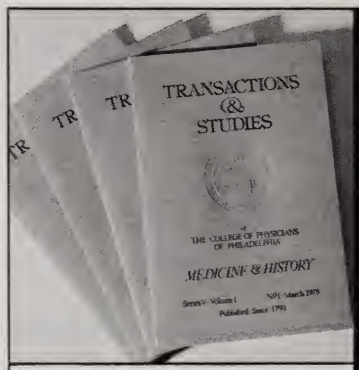

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John Hunter as Expert Witness

THOMAS R. FORBES

EIGHTEENTH century surgeons were called upon occasionally to give expert testimony at coroners' inquests[1] and at trials of persons accused of homicide, assault, or rape. Attention has been called to at least three such appearances by the renowned anatomist, surgeon, and experimental biologist, John Hunter (1728-1793),[2] as well as to expert evidence given by John's physician brother, William.[3] Recently, records of additional forensic medical testimony by John Hunter at London murder trials have been located in the *Old Bailey Sessions Papers*.[4] The latter are published accounts, in greater or lesser detail, of all criminal trials from about 1683 until 1913 at London's Justice Hall, later the Central Criminal Courts and long known as the Old Bailey.[5]

During the eighteenth century, English forensic medicine, lagging far behind the level of this specialty on the Continent, had scarcely begun to develop. Expert medical testimony at murder trials might include some account of the clinical course of the victim between the fatal assault and death, a cursory description of the external appearance of the body, or both. Further postmortem examination was frequently omitted; if the corpse was "opened," dissection was usually incomplete and perfunctory. There was of course no microscopic examination of tissues. Fortunately a few medical men, among them the Hunters and Astley Paston Cooper, took their forensic responsibilities more seriously.

This publication was supported in part by NIH Grant LM 03266 from the National Library of Medicine.

1. T. R. Forbes, "Crowner's Quest," *Trans. Amer. Philos. Soc.* 68(1978):42-48.

2. Jessie Dobson, *John Hunter* (Edinburgh: E. & S. Livingstone, 1969) 220-222. T. R. Forbes, "Two New John Hunter Manuscripts," *Guildhall Stud. London Hist.* 1(1973):24-27.

3. T. R. Forbes, "Death of a Chairman: a New William Hunter Manuscript," *Yale J. Biol. Med.* 49(1976):169-173.

4. *Old Bailey Sessions Papers* is the usual designation for *The Proceedings on the King's Commissions of the Peace, Oyer and Terminer, and Gaol Delivery for the City of London...*(London, various publishers). I searched the *Sessions Papers,* hereafter abbreviated as *OBSP*, at the Guildhall Library, London. My best thanks are due to Mr. Thomas Shaw, Keeper of Printed Books, and his staff for their friendly and untiring assistance, and to Drs. Franklin Robinson and Elias Manuelidis for generous advice.

5. Old Bailey is actually a street on which also stood Newgate Prison and the Surgeon's Theatre, or Surgeon's Hall, where the bodies of executed criminals were dissected. John Timbs, *Curiosities of London* (London: J. S. Virtue [1867])618. The *Sessions Papers* came to be recognized as the official court record. *OBSP,* 17 Nov. 1775, 2.

In May 1753 Richard Jenkins, a butcher, was brought to trial for the murder of his wife. It was testified that during a drunken quarrel he beat and choked her until she collapsed. The husband alleged that she had a fit— she was reportedly subject to seizures— and tried to administer water and hartshorn, containing ammonia to revive her. This failing, he sent for an empiric ("I only practice bleeding, and operations on the teeth"), who bled her but did not restore her to consciousness. The woman died about twelve hours after she was assaulted.

An inquest was scheduled and a surgeon, Nicholas Edwards,was asked by the coroner, to "view" the body. Edwards[6]

> found the skin a little discolour'd, just below the ear, upon the neck. Upon farther enquiry by opening the parts, I did not find any thing that appeared to occasion her death from that part, upon which the [coroner's] jury adjourned, that we might make a farther enquiry.

Two weeks later, Edwards and John Hunter, then 25 years old, conducted another examination at the direction of the coroner. Hunter reported at the trial of the husband that

> we found on the left side her head below the ear, the skin a little discoloured, where Mr. *Edwards* had made an incision to examine it. I examined it a little farther, and found nothing extraordinary there. I examined the other side much in the same manner, but found nothing there. We went then to the brain; we sawed off the skull [calvaria], and examin'd it in the substance of the brain. We found a great deal of coagulated blood, which I believe was the cause of her death.
>
> *Q.* What was that occasioned by?
>
> *Hunter.* I really believe it was by strangulation.

The prisoner testified that his wife was very subject to fits.

> ...I never touched her throat no more than I do this minute....My wife used to have something come up in her throat; I believe it was the rising of the lights. She used to be much affrighted about it.[7]

The two surgeons agree that the woman's apoplexy "was occasioned by suffocation or strangling."[8] The jury found Jenkins guilty of manslaughter. He was sentenced to be branded, the usual punishment for this felony.[9]

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6. In this and the following quotations the punctuation has been partly modernized.

7. Subsequent writers have suggested that this dyspneic affliction, often mentioned as late as the nineteenth century, may have been a manifestation of asthma, croup, or laryngitis. (*Lights* was an old term for lungs.) See, for example, *The Compact Edition of the Oxford English Dictionary* (Oxford: Oxford University Press, 1971) on *rising of the lights* and Robley Dunglison, *A Dictionay of Medical Science* (Philadelphia: H.C.Lea, 1868) on *Cynanche trachealis*, a synonymous term. Seventeenth-century physicians debated whether *rising of the lights* was the same as *rising of the mother, hysteric passion*, etc. An illustrative passage appears in M.N.[Marchamont Nedham], *Medela medicinae* (London: Richard Lownds, 1665), pp. 48-50.

8. Direct trauma to the head seems a more likely explanation for the intracranial hemorrhage.

9. *OBSP*, May 1753, 132-134. The sentence may well, as was usual by the latter part of the eighteenth century, have been carried out with a cold iron. Jeremy Bentham, *Works* (Edinburgh: Wm. Tait, 1843)510-511.

John Hunter testified again in September 1756 at the trial of David Jones, a soldier, for the murder of Ann Hall, widow and his common law wife. Again there had been a tipsy altercation. Jones swept a pot of beer off the table with his hand. The mug struck the woman, who was on a low seat close by, leaving "a very large wound on the side of her head." With the help of a friend, the injury was several times "dress'd with some gin." But the wound did not heal, presumably being infected, and Ann Hall went to St. George's Hospital, where John Hunter had just been appointed house surgeon.[10] This was now about the first of July, a fortnight after she had been injured.

> *Hunter.* The wound itself was not dangerous. I make no doubt but she might have recover'd, if it had been taken care of at the beginning. I believe she died of it, as I found no other illness on her but what was occasion'd by that wound.
>
> *Q.* Did you open her after she was dead?
>
> *Hunter.* I did; it was on the right side of the head. The appearances, I imagine, were occasion'd by a blow on the part.

David Jones was acquitted.[11].

Almost thirty years later, in 1784, Hunter made another appearance at the Old Bailey, on this occasion at the trial on September 17 of the Honourable Cosmo Gordon for the murder of Frederick Thomas, Esq., in a duel with pistols in Hyde Park on September 4. Gordon and Thomas were officers in a British regiment. Most of the expert testimony was offered by a Mr. Alexander Grant, a surgeon who had been in attendance during the duel. When he saw that Gordon's pistol ball had inflicted a serious abdominal wound, Grant sent for John Hunter. The latter simply testified that he

> was informed by Mr. Grant of the circumstances concerning him [Thomas]. Therefore I proceeded to examine him as a surgeon. As far as we could examine the wound, it was hardly possible to judge what mischief was done, only from the symptoms, which seemed rather alarming, and the direction of the wound in general. I attended him near his death.
>
> Have you any doubt what was the occasion of his death?— None.

Witnesses as to the character of Gordon included Sir Henry Clinton, General Paterson, Lord Dunsmore, Admiral Arbuthnot, General Birch, seven colonels, and a captain. The jury was out ten minutes and returned a verdict of Not Guilty.[12]

Earlier that year Hunter became involved in a case that was more of a challenge to his forensic medical skill. At the beginning of May, electioneering was under way for Parliamentary candidates to represent the city of Westminster. The hustings, or temporary platform from which candidates were nominated and made their speeches and close to which the polling was done, had been set up on

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10. Dobson (note 2), p. 34.

11. *OBSP*, Sept. 1756, 306-307.

12. *OBSP*, Sept. 1784, 1031-1048.

the west side of Covent Garden, in the portico of the Church of St. Paul Covent Garden. There had been repeated disturbances. A great crowd filled the street, adherents of the rival political parties waving placards and shouting slogans and abuse. Fighting broke out and a party of constables went into action. One of them, Nicholas Casson, was struck on the head with a bludgeon, knocked down, and trampled. He died a few hours later. At an inquest the next day, four men were indicted for his murder.

The trial was held at the Old Bailey on June 1. Many witnesses testified, among them the playwright, Richard Brinsley Sheridan, who had been caught in the fracas but had not actually seen the fatal attack. John Hunter testified that he had been called as a surgeon to see the injured man shortly after he was struck down. Hunter

> found a man in bed, perfectly in his senses, having all the marks attending either a violent blow on the head, or some injury done to the vital parts of the stomach or the heart. I was informed that he had been bled, and some physic was ordered. I saw nothing more could be done. I examined the man every where as narrowly as I could, but I saw no marks of violence....

The next day, after Casson died, the coroner asked Hunter and another surgeon to "open the body." They found

> three ribs broke on the left side, and some other small marks of violence not of much signification. There was some extravasated blood in the chest. I next examined the head; upon making an incision into his [skull] cap on the left temple, I observed extravasated blood where a blow most probably had been received. When the skull was removed we observed more blood to issue than is common; at the first membrane of the skull [dura mater], we found opposite to the extravasated blood, a considerable quantity of coagulated blood laying between the two membranes of the brain. We examined the scull on the inside, and opposite to that from where the first extravasated blood had appeared, there was found several fractures.
>
> *Court.* Were those [the fractures] the occasions of his death?— No, those were the appearances of it; the extravasated blood found on the right side, opposite to where the blow was given, occasioned by the blow, was the cause of his death.

Four witnesses testified before or after Hunter was on the stand that they saw Casson struck on the head with a club and that he immediately fell to the ground. Two of these witnessess added that the blow was inflicted on the left side of the head.

Hunter's testimony, more precise than most late eighteenth century forensic medical evidence, provides a fairly clear picture of the thoracic and cranial injuries as they were seen at autopsy. An "incision into his cap on the left temple" [presumably through the soft tissues over the cranium] revealed "extravasated blood where a blow most probably had been received." Then subdural hemorrhage was discovered, and finally, "several fractures" on the opposite, *i.e,* right side of the head. In Hunter's opinion, death was the result of the intracranial hemorrhage that followed a shattering blow on the right side of the skull.

Thus, after Casson was struck on the left side of the head— the first cranial insult— and fell at once to the ground, his skull was then fractured on the right side, due either to striking the pavement, or, perhaps, to a second blow with a club or to a kick. If death was, as Hunter stated, due to brain damage occurring when the skull was fractured on the right side, then the initial blow on the left, observed by the witnesses, contributed only indirectly to Casson's death, and the guilt of his first assailant would have been somewhat less. All of this would have been important to the defense of the four prisoners in the dock. But the Court referred only to "the" blow, that on the left, and the record does not mention a second impact.

The judge addressed a final question to John Hunter before he left the stand. "What do you suppose the blow was given with?"

> I should suppose it was given by a blunt instrument. A sharp heavy instrument, such as a rod of iron, will make a very considerable external appearance, perhaps greater than an internal one, but an instrument of a considerable size, and with considerable velocity, may make no external appearance, because it covers so large a surface, but it may give the head such a shock, such a quick velocity, as to produce extravasation.

John Hunter, both in this testimony and in a lecture on "Injuries of the Head", given about two years later, in 1786 or 1787,[13] reveals some understanding of the mechanics of cranial trauma, more, apparently, than that shown by his contemporary, Percivall Pott.[14] In the lecture, recorded in the notes of a student, Hunter remarks that:

> Concussion is always from some considerable violence. It may arise from some degree of displacement of alteration of the texture of some part of the brain....
> Compression may arise from accident, or from many other diseases. Those arising from accident may be either immediate or secondary. Immediate, as when a piece of skull is beaten in upon the brain, or a blood vessel ruptured, producing apoplexy...[p. 257].

In skull fractures there

> may be bleeding at the nose and ears when the fractures must be running over these parts but they may occur without a fracture of these parts, and there are symptoms of other injury besides fracture. When complicated with concussion, the symptoms of this will be less as the fracture is greater, for it is from the bones not giving way easily that the head is violently and quickly moved so as to produce concussion. These effects will be according to the weight and velocity. When the weight is great and the velocity small, we shall have more concussion than with a small weight and great velocity; hence from gun-shot wounds we seldom have any concussion [p. 263].

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13. John Hunter, *Lecture on the Principles of Surgery* (Philadelphia: Haswell, Barrington, and Haswell, 1839) 256-263.

14. Percivall Pott, *Observations on the Nature and Consequences of Those Injuries to Which the Head is Liable from External Violence* (London: L. Hawes, W.Clarke, and R. Collins, 1773.).

Here and in his court testimony is recognition of the elements producing cranial trauma— mass, velocity, inertia, the deceleration permitted by fracture, together with concepts of gross brain damage.

As to the four men accused of the murder of Nicholas Casson, the jury found them Not Guilty.[15]

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15. *OBSP*, June 1784, 650-688.

Medicine, Science and Sport*

ERNST JOKL

TO understand the explosive development of the international sports movement, consideration must be given to a number of unusual changes that occurred during the past century. Some of these changes are of a social nature, others were engendered by the revolutionary advances of science and technology. The result is the establishment of standards of growth, health, and fitness such as have never before existed.

Child Labor

Until the end of the last century child labor existed throughout Europe. A horde of workless, starving vagrants flocked from the countryside into the towns. Children were driven by the poverty of their parents into factories and mines. Child-slaves, orphaned and friendless, were supplied in droves by the workhouses to employers. Children of ten, seven, five and even of three, spent twelve hours at a time in the darkness of the mines. Lord Shaftesbury was among the most active proponents of reform. "Never," he said in a parliamentary debate on child labor in the House of Commons, "have I seen such a display of selfishness, frigidity to every human sentiment, such ready and happy self-delusion."[1] In 1859, children of less than ten, as well as girls and women were excluded altogether from the mines. But it was not until 1875 that boy chimney sweeps were prohibited. The seventies saw compulsory free education established throughout Great Britain and thus a barrier was interposed between children and the factories. In the same decade the first kindergartens were introduced. The Society for the Prevention of Cruelty to Children founded in 1872, took the initiative in promulgating progressive social legislation. It goes without saying that children until then had been in poor health, neither willing nor able to engage in sport.

Leisure

To understand why, during the past decades, sport has become one of the major leisure pursuits of mankind, it must be realized that the concepts of both leisure and sport have only recently assumed their present meaning. The idea that time for leisure would be available to the common man sounded revolutionary not so long ago, when the worker, unless he was working, rested in order to recuperate

1. Sylvia Lynd, *English Children* (London: William Collins, 1942) 40-41.

*A lecture delivered at Thomas Jefferson University on November 14, 1979.

from and gather new strength for work. The boys and girls who slaved in coal mines and textile mills around the middle of the nineteenth century had neither the time nor the strength to play. Their as well as their elders' situation was incomparably worse than that which had prevailed during the preceding millennium in the relatively stable rural village environment predominant throughout Western Europe.

Health

That medicine would ever become a science was beyond imagination until not so long ago. As an example, let us refer to the gorgeous portrait of Louis XIV (1638-1715) by Hyacinthe Rigaud. It shows the Grand Monarch in his ermine-lined robes of state, scepter in hand, arm on hip, gazing out on the world with affable condescension and consummate poise. We see the epitome of majesty: grace, dignity, command. It is a disillusioning experience to turn to the King's private life as described by his doctors. A disconcertingly human figure emerges, a man plagued by chronic infirmities of all kinds; pestered by doctors and surgeons; subjected to incredible purges, enemas, and emetics. The health of even the humblest citizens today is infinitely better protected than that of 'The Sun King' 300 years ago. Throughout his reign Louis XIV was attended by three *premier medicins* who kept a "Journal de la Santé du Roi." It describes the illnesses of the royal patient: "rheumatism, vapours, humours, fistula, insomnia, indigestion, fluxes, headaches, chronic fevers, anthrax, melancholy, urinary difficulties, night sweats, vertigo, erysipelas, colds, colic, bile, acid mouth, chronic toothaches, and inevitably, a great deal of gout."[2] It is not difficult to understand why, as his biographer Philippe Aries mentions, "Louis XIV showed a marked lack of enthusiasm for tennis."[3]

Recruits 1790-1810

In order to assess the extent to which physique, strength and fitness of the present generation of youths in the United States and Europe has benefited from advances in science and technology, one must evaluate documentary evidence concerning the status of young people two centuries ago. A book entitled *The Enlisting, Discharging and Pensioning of Soldiers During the Years 1790-1819,* published in 1839[4] by Henry Marshall, Deputy Inspector-General of British

2. Leon Bernard, "Medicine at the Court of Louis XIV," *Medical History* 3(1962): 201-203.

3. Philippe Aries, *Centuries of Childhood* (New York: Vintage Books, 1922) 98.

4. D. T. Richardson, "Medical Standards of Recruits One Hundred Years Ago," *Journal of the Royal Army Medical Corps* 71(1938): 1-ff.

Army Hospitals, relates that the 100,000 men who during that period had enlisted on a long service contract of 21 years were a miserable lot: for a regiment, recruited in 1797 at Cork for embarcation to Buenos Aires, minimum weight was 116 lb. 9 oz. (52 kg), minimum height 5 ft. 5 1/2 in. (1.66 m). Every recruit who complied with these standards was accepted, irrespective of his age. In the French Army minimum weight was 110 lb. (50 kg), minimum height 5 ft. 2 in. (1.575 m). Ten percent of today's U.S. schoolboys of 12 years of age would thus have qualified for acceptance! Every conceivable disease — epilepsy, palsy, insanity, rheumatism, hernia, blindness, ulcerations — was either simulated or intentionally reproduced in attempts to get out of the army. Nor did lashes deter malingerers from their purpose. Hernias were produced by incising the scrotum, inserting the stem of a clay pipe and with the assistance of a friend, blowing until the skin was as tight as a drum. Men were prepared to lose the sight of one eye if this could get them their discharge. This was done by the application of a caustic, by scraping the surface of the cornea, or by piercing it with a sharp needle and scratching the lens to cause cataract.

Nutrition

The conquest of hunger and malnutrition is but a recent triumph of science. The role of vitamins as essential elements of a good diet was unknown until the beginning of this century. In 1913 Sir John Boyd-Orr assessed the incidence of rickets in Glasgow, Scotland: 40% of the city's school population was found to be afflicted. In a repeat survey in 1936 only 10% of the children in Glasgow had rickets; Vitamin D had been identified by Adolf Windaus of Goettingen who was awarded a Nobel Prize in 1928. The Glasgow study was repeated once more in 1965 when not a single case of rickets was found among children born in Glasgow.[5] However, the incidence of rickets among Asian immigrants to England today is comparable to what it had been in Glasgow in 1913. Malnutrition is still widespread in Asia and Africa; while in the affluent societies obesity has become a major health problem.

Infectious Diseases

The greatest single contribution of medical research to society has been the control of infectious diseases. In 1900 infectious diseases were responsible for most deaths in the United States. Throughout the preceding centuries no family was spared the sorrow of children dying from 'fevers.' In his Johann Sebastian Bach Memorial Lecture delivered at Hamburg in 1950, Paul Hindemith mentioned that Bach lost 11 children during his life. Today few children die

5. Lord Orr to Ernst Jokl, January 1970.

during infancy. The chief causes of death in the United States are no longer infectious diseases but cardiovascular afflictions, malignant tumors, accidents and crime. The length of life has increased from 48 in 1898 to 70 years today. Whooping cough, diphtheria, smallpox and poliomyelitis were brought under control only after World War II.

Acceleration of Growth

It is against the background of changes such as these that the favorable status of children today must be assessed. Today's boys and girls are taller and stronger than their parents and grandparents. An average-sized high school boy aged 17 does not fit into the armor of Elizabethan knights in the Tower of London. There has been a steady 'acceleration of growth and maturation' over the centuries, with a noticeable spurt during the past decades. One manifestation of this spurt is the appearance today of children and adolescents in sports such as swimming, gymnastics, ice-skating, and other athletic disciplines. Children nowadays run the 26 mile marathon, climb the highest mountains, and participate in long distance ski races. In 1979 two twelve-year-old boys swam the British Channel; at the Pan African Track and Field Games in Nairobi in July, 1979 a 12-year-old girl won the 1500 m final against adult competition.

The corresponding opposite to the acceleration of growth' is a 'deceleration of aging,' a phenomenon which represents the physiological basis for the participation of large numbers of older men and women in a great variety of sporting events. At the Montreal Olympic Games in 1976, more than 400 athletes of over 40 years of age entered the competitions, several of them with conspicuous success. At Moscow in 1980, the number of senior Olympians will be even greater.

Women in Sport

The athletic status of women reflects the far reaching changes that have taken place in the Western world during this century. The unfolding of the power potential of the 'Second Sex' is still in progress even though scientific evidence on the performance capacities of women had been available long before it was applied in practice.

"A horse sweats, a man perspires, but a lady only glows." This statement illustrates the Victorian attitude towards exercise and athletics for girls. Since then, social attitudes have undergone profound changes. During the past 50 years, millions of girls have engaged in sports, gymnastics and games; have competed in swimming, in track and field events and in horseback riding; have climbed many of the highest mountains, and have swum through a thousand

rivers and lakes. They have derived therefrom some of the most valuable experiences of their lives. All the evil ghosts of which they had been warned were absent. The women did not develop 'a masculine appearance;' most of them married and had children; none has suffered moral or physical damage or 'overstrain' from muscular exertion; their hearts have not been 'weakened through athletics;' and most of them reach a ripe old age.

That the present generation of women grows stronger; that their physical maturation is better balanced; that their appearance has become more attractive; that the state of health of young mothers and of their children today is superior; that physically active women no longer look old at the age of 30; that many schoolgirls play on the same teams as their mothers; all this is, at least in part, the result of the interest now taken in the physical education of girls. Sports and games and athletics for women are significant elements of what is best in contemporary culture.[6]

The role of women in sport was discussed in antiquity. In Plato's *Republic,*[7] Socrates raises the question, if women are to have the same duties as men, must they have the same nurture and education? Socrates points out that it is not so long since the Greeks thought it ridiculous as well as shameful for men to be seen naked in the gymnasium. When gymnastic exercises were first introduced in Crete and later in Sparta, the cynics had their chance to make fun of them. But a new attitude was soon accepted and by analogy it would be the same once women are given equal access to physical education.

However, Plato was concerned with the education of an elite, a selected group of leaders of proven excellence of character, of mind, and of body. Thus he argued logically that once the principle of selection is recognized and the wide scope of individual differences among men as well as women accepted, a distinction between the educational systems for boys and girls is no longer justified.

The fact that well-trained women athletes are superior to untrained men in all branches of sport signifies a revolutionary change in society's attitude towards the female sex. Views held until recently, according to which menstruation, pregnancy, childbearing, and menopause exclude females from participation in sport, have been shown to be false.

In several athletic disciplines women's performances now equal those of men. In terms of esthetic criteria women athletes rank above men, e.g., in gymnastics and ice-skating. The physical educability of women is much greater than had been assumed until recently: A young woman became champion of the State of Washington in weight lifting in the flyweight class (52 kg), winning the event against male competitors. Few if any men could have beaten Olga Korbut and Nadja Comaneci on the uneven parallel bars and the balance beam in 1972 and 1976; the 400 m running world record of 48.6 seconds established by Marita Koch

6. F. J. J. Buytenkijk, *Die Frau. Natur, Erscheinug, Dasein* (Cologne: P.J. Bachem, 1953).

7. The discussion is in the *Republic,* Book V, 451 f.

in 1978 is certainly remarkable. At several marathon races held in the U.S. in 1978 more than 1000 women started, 96% finished. The current women's world record of under 2½ hours is equal to or faster than Olympic winning times by men prior to World War II. Most of the best women athletes in 1978 would have won their respective track and field events for men at Olympic Games a few decades ago: Marita Koch (400 m 48.60); Tatyana Zelentsova (400 m hurdles 54.89); Evelin Jahl (discus 70.72 m); Ruth Fuchs (javelin 69.16 m); Sara Simeoni (high jump 2.01 m); and Rosemarie Ackerman (1.99 m); Grazyna Rabsztyn (100 m hurdles 12.48); and Johanna Klier (100 m hurdles 12.62).

Athletic Records

The chief elements from which all physical performances are synthesized have been identified through analysis of athletic records. The world's best performances in sport have been documented since the beginning of this century, some of them longer. It has thus been possible to construct growth curves of world records for all sports events, including those held at Olympic games. From them, the magnitude of the performance explosion that has taken place during the past decades in all branches of sport can be assessed. However, rates of performance growth differ for different athletic disciplines. In swimming the growth curve of performances continue; whereas in short and middle distance track races the steep ascent of record growth curves is about to come to an end. In a few events, terminal positions have already been reached: The probability that Bob Beamon's long jump record of 29′ 2 1/2″ (8.90 m), established in Mexico City in 1968, will be improved is not great. Altogether it is not generally realized that "the expanding athletic universe" is bound to reach its limits.

Unexplored Resources

As to the future of athletic records it must be taken into account that from the advances of science and technology which have resulted in the conquest of hunger and the control of infectious diseases, not more than a quarter of mankind has as yet benefited. The medical status of most of the populations of Asia and Africa today is not better than it was in Europe during the Middle Ages. The extent to which infectious diseases affect the physical status of entire ethnic groups became evident during the past 20 years in East Africa when smallpox was eradicated through the introduction of vaccination. Only then did Hamitic athletes from Tanzania, Ethiopia and Kenya appear on the international athletic scene. Conspicuous successes at the 1972 Olympic Games established their countries as major track and field powers. Their status will continue to gain as additional public health measures become effective. A world-wide upgrading of all sports performances is bound to take place when the results of preventive and curative

measures that are currently introduced by the World Health Organization throughout the Third World become noticeable. The issue has wide implications.

Generally held beliefs that medical science has succeeded in conquering most of the great killer diseases of mankind are fallacious. In the *Listener* of August 9, 1979, Brian J. Ford pointed out that:

> We cannot yet reliably cure any virus disease and know next to nothing of the cause or the cure of a host of major scourges, from cancer and coronary heart attacks to schizophrenia, arthritis, strokes and the degenerative diseases, from cystic fibrosis to Huntington's chorea. The tropical diseases alone, from schistosomiasis and river blindness to an array of worm parasites and the trypanosomes which waste the body, afflict hundreds of millions of people.

During the next two decades public health measures are likely to reduce the incidence of all diseases everywhere. A world-wide advance in growth and development should thus occur and will generate further improvements in athletic records. Considering the achievements of medical research so far, such forecasts seem justified.

Technological innovations will continue to play an important role in the athletic performance explosion of our century. The introduction of Tartan tracks, newly designed javelins and discuses, fiberglass poles and foam rubber mats have noticeably altered the entire track and field scene. The temperature control of swimming pools, improved filtration systems, establishment of smooth water surfaces through vertical lane markers, have facilitated the establishment of new swimming records. The availability of large indoor facilities, such as those provided in the air-conditioned Astrodome in Houston and the Louisiana Superdome in New Orleans, has opened vistas not as yet fully explored, e.g., that of creating optimal room temperatures and other advantageous environmental conditions for individual athletic events throughout the year.

Last, but not least, the fact that numbers of participants in all sports are continually increasing throughout the world renders probable the appearance from time to time of "athletic geniuses" and thus the establishment of extraordinary records — the Bob Beamon phenomenon is likely to recur in other athletic disciplines even though no predictions are possible as to date and place.

The Fields Beyond

Once the limits of physical performance growth are reached, a chief objective of athletics will be to explore the esthetic possibilities that are inherent in sport, possibilities derived from the inexhaustible choice of designs of expression and communication of human movements.

In a few decades from now, the athletic situation will be comparable to that of oil painting in the middle of the seventeenth century, of the ballet prior to World War I, and of piano music during the first decade of our country.

The development of oil painting extended over the better part of two centuries, starting in the fifteenth century with Jan van Eyck's search for a

varnish which would dry without being put in the sun. His discovery was subsequently elaborated by Giovanni Bellini from whom Albrecht Dürer learned the technique he applied in his masterpiece "The Four Apostles." Oil painting reached its ultimate perfection with Diego Velázquez, Jan Breughel, and Peter Paul Rubens.

The technical possibilities of the ballet were explored during the early years of our century, when Serge Diaghilev presented his Ballet Russe in Paris, with Michel Fokine as choreographer, Vaslav Nijinski, Anna Pavlova and Tamara Karsavina as dancers and Picasso, Derain and Benois as 'decorators.' From it emerged Emile Jaques-Dalcroze's *Musical Calisthenics*, Claude-Achille Debussy's *Dance Plays,* Richard Strauss' *Josephs Legende,* and, most recently, John Cranko's *Stuttgart Ballet.*

Piano technique as we know it started with Beethoven's use of the hammerklavier and its exploration through his pupil Carl Czerny, who became the teacher of Franz Liszt. To Liszt's Weimar school belonged Eugene d'Albert and Ferruccio Busoni, under whose direction Egon Petri acquired the ultimate level of keyboard mastery, equaled but not surpassed by today's greatest pianists, not even by Vladimir Horowitz, Rudolf Serkin, Sviatoslav Richter, and Benedetti Michelangeli.

When the history of gymnastics is written, the names of Olga Korbut, Nadja Comaneci, Nelli Kim, and their teachers will rank in the chronology of the subject like those to whom the arts are indebted for the technical perfection of painting, dancing, and music.

Through the unprecedented differentiation of the motor system which sport in all its manifestations is capable of accomplishing, it is destined to reveal its powers of experience and communication and thus of creating a new culture — the third, if one considers the humanities and the natural sciences first and second.

The number of those who will take full advantage of this "third culture" will remain limited, just as the number of those who in the past realized the esthetic and intellectual possibilities derived from the arts and sciences remained limited. The pursuit of excellence in all its forms has always been entrusted to an elite in the sense in which Lord Clark has defined the term:

> If you don't have an elite in some sense of the word — and it does not mean a class elite — , and some people of superior mind and character, guiding the people then it all falls into barbarism. The general rough-and-tumble of uneducated people is not going to produce a civilisation.[8]

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8. Kenneth Clark, *Civilisation* (London: British Broadcasting Corporation, 1969).

BIBLIOGRAPHY

Astrand, P. O. and Kaare Rodahl. *Textbook of Work Physiology*. New York: McGraw-Hill, 1970.

Buytenkijk, F. J. J. *Die Frau. Natur, Erscheinung, Dasein*. P. J. Bachem, Koln, 1953.

Clark, Kenneth. *Civilisation*. London: British Broadcasting Corp., 1969.

Hill, A. V. "The physiological basis of athletic records," *Nature* 116: 544-548, 1925.

Jokl, Ernst and Jokl, Peter. *The Physiological Basis of Athletic Records*. Illinois: Thomas, 1968.

Jokl, Ernst. "Running, Psychology, and Culture," in *The Marathon: Physiological, Medical, Epidemiological, and Psychological Studies. Annals of the New York Academy of Sciences* 301, 1977.

Maheu, R. "Sport and Culture," in *UNESCO International Journal of Adult and Youth Education* 14(4), 1962.

Mangi, Richard; Jokl, Peter and Dayton, O. William. *The Runner's Complete Medical Guide*. New York: Summit Books, 1979.

Sherrington, Sir Charles. *Man on His Nature*. Cambridge, England, 1940.

Straus, Erwin. *Phenomenological Psychology: Selected Papers*. New York: Basic Books, 1965.

The Last Day of Psametik, Physician to Pharaoh

A Tale by Paul Ghalioungui*

THE barge of the god Re[1] had not emerged from Akhet, the Horizon, when the old man awoke from his light sleep and stretched his tired limbs. He sensed his apprentice, Amose, approaching silently. Seeing his master awake, the young man respectfully raised his arm to his shoulder, and bent deeply to offer morning greetings:

"Life, Health, and Prosperity.[2] May my master and teacher Psametik[3] ever be protected by the gods. May Amon grant him joy in his heart and a good old age."

"Your morning be happy, Amose. What news do you bring?"

"Master, this is the day of the monthly purification.[4] I have prepared the emetic and kept colocynth, juniper, and figs for a whole night in the dew. I have mixed them with sweet beer and honey for your purification, according to the instructions of the sacred books that are to be divulged to none but your children (Eb. 137, 206). The barber has sharpened his bronze razor to remove the hair from your body. We have prepared some of the scent offered to my Master by the Great House,[5] out of the tribute of the Land of Punt, and a bath of natron, ashes, and warm water."

An hour later, when he had been through his toilet (Figure 1) and accomplished the rites appropriate to that sacred day, Psametik proceeded to the

1. The sun.

2. This is the formula that usually follows the name of Pharaoh.

3. Several physicians in ancient Egypt were named Psametik. One was Chief of the Physicians of Upper and Lower Egypt; another was Dean of Physicians.

4. Diodorus Siculus (I. 82) relates that priests had to take emetics and purges three days a month.

5. Metaphor for Pharaoh.

*Author's Note: This is an imaginary tale but all the details and texts are historical. The great liberty was taken, however, of collecting into one day and attributing to a single person events and writings that belong to widely distant epochs. Moreover, most of the quotations have been modernized and shortened. I hope that purists will not mind these anachronisms, since the available medical papyri are themselves cross-sections of a discipline that must have changed greatly throughout Egyptian history.

Editor's note. This article, written by an acknowledged master of pharaonic medicine, is of a kind not often found in scholarly periodicals. It is a narrative, but it is based entirely on documented materials, which have been telescoped chronologically in order to form a coherent account. It is intended to present aspects of ancient Egyptian medicine in lifelike form.

Abbreviations: Eb. = Ebbel, B., 1937, *The Papyrus Ebers,* Levin and Munkigaard, Copenhagen; *S.* = Breasted, J., *The Edwin Smith Papyrus,* Chicago: The University of Chicago Press; *p.* = *Papyrus; Zaub* = *Zauberspruche fur Kind und Mutter:* Erman, A., 1901, Berlin Papyrus 3027, Abhandlungen, d. Konigl, Preuss. Akademie.

Figure 1. The toilet of a gentleman "Ptah-Hetep's tomb." Old kingdom Saqqara.

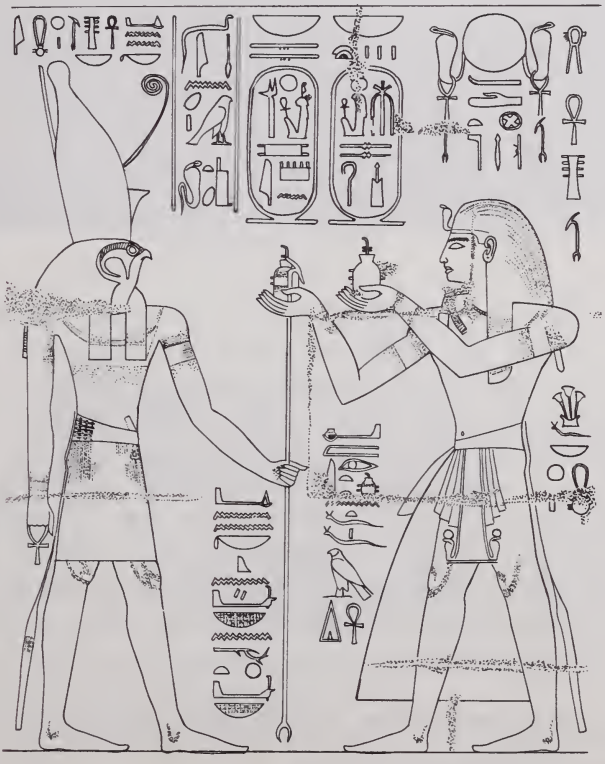

Figure 2. Offering wine to the god.

house of the god, to share in the awakening prayers of the Rising Sun. He slowly crossed the pylons and courts, and walked along a forest of columns under the gaze of the statues of previous kings. He stopped at the threshold of the Holy of Holies. He stood there in awe with court and clergy outside the sanctuary where the High Priest was giving a morning bath to the image of the god, anointing him with the seven sacred oils, and presenting him with the prescribed offerings (Figure 2). The priest addressed his divinity:[6]

Awake in peace, cleansed One
Awake in peace, Harakhte[7]
For you are He who overlooks the gods, and there is no god that overlooks you.
Praise to you, Bull of his mother,[8] (Figure 3) Lord of Truth, father of gods,.
Who made mankind and created beasts
Praise to you whose chapel is hidden, Lord of gods
Who gave commands whereupon the gods came into being
He who hears the prayer of the prisoner, kind of heart when one calls him,
Who judges between the miserable and the strong.
I will give praise up to the height of heaven and over the breadth of earth
I will declare your might to him that fares downstream and to him that fares upstream
I will tell it to son and daughter, to great and small,
To generations and generations that yet exist not,
To the fish of the water, to the fowl in heaven,
You, Amon-Re, Lord of Thebes, the Savior of those who dwell in the nether world.[8]

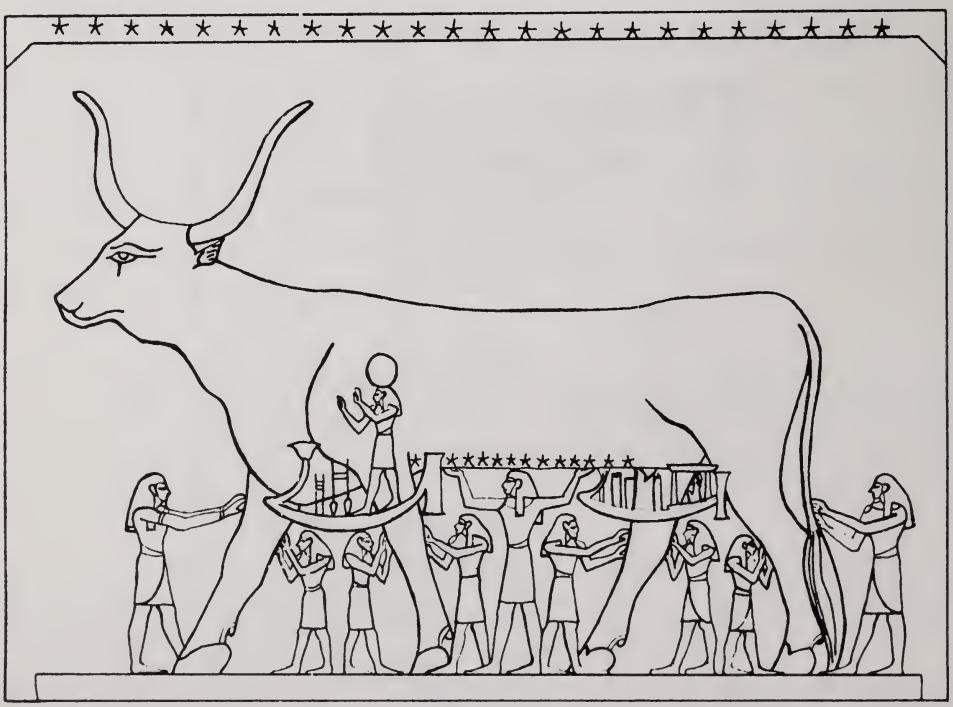

Figure 3. The sacred cow giving birth to the sun, that travels on its boat across the sky.

6. Erman, A. D.: *The Ancient Egyptians, A Sourcebook of Their Writings*. Translated by A.M. Blackman. New York, 1966.

7. Harakhte, Horus of the Horizon, the Sphinx.

8. Bull of his mother. The sun was the husband of the Sky goddess, but, in the shape of the rising sun, he was also her son. This song was compounded from many religious hymns.

While he was on his way back home, the stars had already faded in the light of Re. He heard, with increasing clarity, the voice of the blind harper whom he had hired to entertain his household. That day the musician was striking a gloomy note (Figure 4):

> Bodies disappear and go while other remain.
> The gods that were repose in their pyramids with the noble and the happy
> Their walls have fallen in ruin as if they never existed.[9]

Figure 4. The blind harper.

Amose was hurrying towards him: "O, Praised by Re! One of the sailors of the royal barge has fallen from the gangway. He was brought here suffering from a broken clavicle. I read the Book (S.35) and it said: 'An ailment to be treated.' I laid him down on his back, placed between his two shoulders a roll of linen, and let his shoulders fall back until the bone dropped and its ends came into alignment. I then fixed him in splints. Was I correct?"

"You did well, my son. It was Thot[10] who taught our ancestors this wisdom, and they put it in their writings. If we follow their teachings, we are free from blame, even if we fail.[11] Unfortunately, their writings reached us in the most adulterated condition and with much loss. What a pity we have only those tattered fragments

9. From "The Song of the Harper," Erman,[6] p. 133.

10. Thot was the god of all knowledge, including medicine.

11. Diodorus Siculus I. 82.

that we copy in the House of Life.[12] To condense the legacy of centuries in a single roll is to create the impression that the physicians of Menes practiced the same medicine as ourselves. In art, what is the common measure to compare statues of Djeser and Tutankhamen?[13]

"But take heed, Amose, when reading the ancient books. If they prescribe Thot's feather, a rat's tail, heaven's eye, a fly's blood, a donkey's head, or a pig's tooth, do not fly to heaven or dip into sties to pick your 'simples.' These words sometimes are masks that we use to keep our knowledge from the laity and others are the fruits of popular imagination. Did you go this morning to the House of Life?"

With youthful infatuation, Amose replied: "I am the pupil of the greatest living physician. What would I gain in these old men's retreats?"

"How often did I pour Ptah-hetep's teachings into your ears?" answered Psametik with irritation. "Repeat them to me at once."

Amose bent, his face red with shame:

"Be not arrogant because of your knowledge, and have no confidence that you are a learned man. Take counsel with the ignorant as with the wise, for the limits of the art cannot be reached and no artist fully possesses his skill."[14]

"Do you remember what Ani the philosopher told his son?"[15]

"Write with your hand and read with your mouth. Ask counsel of them that have more knowledge than you. Spend not a day in idleness or woe betide your limbs."[16]

"And where is your brother? I am told that he forsakes writing and gives himself to pleasure. He goes, I hear, from street to street where it smells of beer. His drinking causes men to avoid him and sends his soul to perdition. He walks like a broken oar, obedient on neither side. He is like a shrine without its god, like a house without bread."

After a pause, Psametik asked: "Are there any waiting patients?"

The first of these was a woman of the people carrying in her arms a miserable little creature with swollen belly, bony limbs, and flushed cheeks. The woman threw herself at the physician's feet.

"My lord! Thot gave you the knowledge of the formulas composed by the Lord of the Universe to expel afflictions. He is your guide, He who lets writing speak and has composed the books (Eb. 1). Save my child!"

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12. The papyri that we possess are copies of fragments of much older papyri of varying merit, gathered on the same scrolls, often with little discrimination.

13. They were separated by about 1,000 years.

14. Ptah-hetep's instructions were written between 2870 and 2675 B.C., and were used as a schoolbook until very late.

15. Erman (note 6), 189-190.

16. i.e., or else you will be beaten.

Psametik listened carefully to the woman's account nodding at times.

"Woe to you, ignorant woman! How could you still, in the enlightened days of our pharaoh, do what our remote ancestors did before Thot lit their hearts with his science? Did you really give your child a fried mouse to eat?[17] Have these quackeries not been forbidden? I shall demand audience from the Great House to report these devilries. Indeed, the charlatans have infected even our learned scribes, who have lately thought they would revive our ancient traditions by copying this despicable nonsense on the same pages which record our most venerable teachings.[18] They behave like donkeys which carry libraries without discriminating between the jewels of wisdom and the dung of quacks! Have we any other patients?"

"Many, but I am sending back those with minor illnesses."

Psametik chidingly recited to Amose one of the surviving teachings of Onkhchechonk:

> Do not overlook a small illness,
> If there is a remedy, take it.
> Difficult is the cure of one who is everyday increasingly dominated by disease.
> Even a small snake carries venom...
> Even a small truth saves its owner.
> Even a small lie causes woe to him who says it.
> Even a small worry breaks bones.
> Even a small joy keeps a heart alive.
> Even a small dew keeps the field alive.
> Numerous are the small things to be feared.
> Rare are the big things to be admired.[19]

To appease his master's wrath Amose quietly approached his master with a knowing smile.

"The Great House, great in victories, has sent you a gift as an acknowledgment of your immense knowledge and a token of His august appreciation."

Proceeding to a corner of the room, Amose uncovered a large stone block, carefully carved in the most beautiful of hieroglyphics. The unbelieving Psametik gazed at this stone and read aloud:

> As my nostrils breathe health, as the gods love me, may you depart revered to the cemetery at an advanced old age.

"Really," he added, "the Son of Amon had done this because He knows that which is inside the body."[20]

Appeased and proud, he then asked who had brought the heavy slab from the Palace. The attendants whispered, and an unaccustomed flurry reached his ears. The door was flung open, and amid bowings and reverences an old lady entered, bearing an air of authority without arrogance. She quietly waved her hand to the people in the room signaling her desire for secrecy. This was Lady Peseshet,

17. Erman, A., 1901, *Zauberspruche fur Kind und Mutter,* Berlin Papyrus 3027, Abhandlungen d. Konigl. Preuss. Akademie, Berlin, vs. 8, 2-3.

18. In late epochs there was a return to magic.

19. Translated from Daumas, F.: *La Civilization de l'Egypte Pharaonique.* Paris, Artaud, 1965, 424.

20. This was a present sent by Pharaoh Sahoure of the fifth dynasty to his physician Ni-ankh-Sekhmet.

Overseer of the *ka* Servants of the King's Mother, Concerned with the King's Affairs, and Overseer of the Lady Physicians.[21] She enjoyed high standing in the royal harem. When finally alone with Psametik, she explained: "The objects of my visit must be kept secret. My divine mistress has lately felt some coldness on the part of her Royal Spouse, who bestows his attention on a young slave from the land of Retenu.[22] She is losing her hair; her breasts no longer have their pomegranate firmness. Wrinkles and freckles blemish her august face, her teeth are loose. Worst of all, her august husband keeps his mouth aloof from hers."

"My sister," said Psametik, "no one can drive back the Sunboat in its course. But tell your mistress that ricinus seeds ground in oil and rubbed on her head will give new vigor to her hair (Eb.251). If this fails, Thot prescribes stronger measures. Smear her head with the blood that flows from a bitch's genitals (Eb.460), or with the placenta of a she-cat (Eb.453). As for her breasts, let her rub herself with the first monthly flow of one of her maids; they will rise again (Eb.808) if she recites this spell:

> It is this breast that was ill when Isis in Chemmis gave birth to Shu and Tefnut (Eb.810).

Then let her ask Menkaoureankh[23] to take out the worm that eats the substance of her teeth and to fasten these with frankincense and malachite (Eb.743). The fallen teeth he will bind each to its neighbor with a gold wire. She should then sweeten her mouth with balls of myrrh, frankincense, cinnamon, and aromatic reed boiled in honey (Eb.853). Erase the blemishes on her face with fenugreek oil (S. *verso*).

Peseshet, having taken note of these instructions, went on:

"Master, may I ask another question? The Great House, as you know, has no sons. It would like to know which of the spouses can bear no children, and which of the spouses who are now with child will be favored with a boy."

"To know the fertile ones, give them all a pessary of garlic. If you perceive its smell in their breath, they are fertile. In order to know the sex of a fetus, let the pregnant ones pass their water on barley and on wheat. If barley grows better, it will be a boy; if wheat grows better it will be a girl."

Satisfied, the old woman rose and left a present of gold. Psametik resumed his daily routine, dictating the notes that Amose diligently copied:

> Roundworm in the belly: pomegranate root 5 *ro* in 10 *ro* of water. Keep in the dew overnight and take it in one day (Eb.50); if it is not evacuated, mix *sam* plant and resin and give it to be eaten. All worms will be expelled (Eb.64).

A noise in the antechamber interrupted their work. Amose dropped his writing kit and hurried out. A discussion had arisen, quiet at first but quickly becoming more animated. A servant screamed:

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21. Peseshet, a lady Physician of the Ancient Kingdom who bore the title mentioned.

22. Syria.

23. A dental man who was not a physician; mentioned on the stele of Ni-ankh-Sekhmet. See above, n. 20.

"The midwife who was called from the House of Life of Sais[24] has examined the milk of your daughter, Neferit, and found it smelling of *snj* (Eb.788). Under the curse of her mother-in-law though she has left for the dark world of Apophis, her child is growing as weak as a flowing breath.[25] Her spells caused her premature delivery on the thirteenth day of the accursed month of Perit.[26] In spite of the name you gave him, Djed-Ptah-iouf-ankh (Ptah says he will live), the baby turned its face downwards when it was born and cried *mby* (Eb.838). It will not live unless we fight her devilish deeds, for she accused your daughter of bewitching her son with the blood of her heart finger,[27]* and she kept trying during her lifetime to estrange them from each other by her divination."

"What nonsense is this? Neither your mistress's mother-in-law nor anybody else, living or dead, has any power over that baby."

He was interrupted by Amose rushing up and holding in his hands a dead cat, stiff and wet. The sacred beast had been found behind Neferit's door.

"They do not stop at sorcery. Read what was written on this bit of papyrus around its neck:

> Come to me, cat-imaged god; look at your image defiled by your enemies. Avenge yourself against them. Gather your forces against them. Rise for me, cat-imaged god and do not allow the children of this woman to live.[28]

"She thinks that by her magic she can project the sin upon her daughter. Throw away everything that is in her jars. Let nobody touch the water where this cat, the image of the divine Bastet, was found."

"My mistress is mourning," (Figure 5) pleaded Neferit's maid, "She beseeches her father to allow her to call a magician to undo all these spells."

"Not here," screamed Amose, "Not in my teacher's house. Not for his daughter."

After a long pause Amose slowly and firmly said:

"My master and teacher! I was your pupil before I was circumcised. My ear was on my back, but I listened attentively without being beaten. Time after time you exposed the quackery of those who deceive the ignorant, who never learned in the House of Life the secret and necessary art."

He stopped, amazed at his own boldness. But it was Psametik who proceeded: "Yes, my son, but listen to an old man. A sick man is not a mere vehicle of disease. Each part in him obeys the heart that speaks to the limbs through the vessels (Eb. 854 b). In that way a god controls each organ, and the body is a divine model of the

24. In the House of Life of Sais, obstetrics was taught to midwives.

25. A mythological dragon that tried to swallow the sun. It symbolized the hostile forces of chaos that tried to disorganize the universe.

26. On that day the eye of the fierce goddess Sekhmet had turned red.

27. Engelcke, H., 1885-1886, Le Papyrus de Leyde, 1347-1349, traduit et transcrit par A. Massry, *Etudes Egyptologiques* no. XI, 3-4, 22-23.

28. Capart, J.: Chats Sacrés. *Chronique de'Egypte* 18:36-37, 1943.

*The second finger of her left hand that a nerve connects to the heart.

Figure 5. Mourning Mereruka's tomb. Old kingdom, Saqqara.

oneness of God amidst His multiple faces.

"Listen, Amose. When the Princess of Bekhtan fell ill, my old master Pa-ti-esht, one of the most learned among the learned on being sent to treat her was told, 'None but you can leave for Bekhtan. There is nothing on which you would be questioned to which you would not find an answer.' Nevertheless, after examining the Princess, my master said: 'This is an ailment I shall not treat. Go to him who is more powerful than I, to the god Khonsu of Thebes. He can cure her.'[29]

To save my beloved grandson we have tried all the measures we know, even the milk of a nurse who had borne a male child (Figure 6) but the mouth of his heart[30] could not keep it. Prayers and invocations will not diminish the efficacy of our drugs, for Thot said, 'Powerful are medicines with words, and the reverse is true' (Eb. 2). If my daughter thinks that a magician can defeat her mother-in-law, this might bring light into her darkness. If it be said that a father's love allowed a sorcerer into my house, this will not diminish my fame. Were not Ipy, Iry, Antiemhat (Figure 7), and others, versed in magic? You are aware of the weakness of women. They are guided not by the power of logic, but by the violence of passions. My daughter labors under an unreasonable belief. To an unusual ill, let us oppose an unusual medication."

He stopped, slowly turned away, and added, "But let it not be done in my presence."

29. Lefebvre, G.: *Romans et Contes*. Paris, Adrien-Maisonneuve, 1949.
30. The Stomach.

Figure 6. The milk of a woman who had had a male child was a potent remedy. It was probably kept in such jars, made in the shape of Ta-urt, the hippopotamus goddess, through whose breasts milk was sucked.

Figure 7. The stele that the physician Antiemhat shared with a lector priest. On the left, in the 7th row from above, the scepter and scorpion qualify him as "master of scorpions," a magic title.

He had no sooner turned around the corner than the servants, fluttering with hope, ran to a man who had been squatting with his apprentice since dawn outside the house. They dragged him to the room where the newly delivered girl was rocking a baby in her lap and singing a lullaby:

> Did you come to kiss that child? I will not allow you to kiss it.
> Did you come to harm it? I will not let you harm it.
> Did you come to carry it away? I will not allow you to carry it away with you.[31]

With the quiet assurance of one accustomed to command, the man ordered his assistant: "Lay the forty pearls, the seven emeralds, the seven pieces of gold, and the statue of Djed-Hor on the table."

Then, with the burning end of a stick that his apprentice had been turning on a fire drill, he lit incense, myrrh, and natron in front of two statues of Isis and Nephthys, and picked seven strings of linen from a small bag. He twisted and knotted them, at the same time making ritual gestures over the pearls, the emeralds, and the pieces of gold while saying in a low voice:

> Hail, o seven knots with which Isis wove, and Nephthys spun, a wide knot of divine cloth made of seven knots. You will henceforth be protected by it; it will make you healthy; it will cause all gods and goddesses to be propitious. Do I not know them? But they are not known to him who wishes evil to that child to the point of making him ill.[32]

He repeated the spell four times, more loudly each time, and wound the strings around the neck of the baby. Then, haggard, looking afar at an unseen enemy, and gradually working himself into a crescendo of fury he called out:

> Flow out, poison, come forth upon the ground. Horus conjures you, he cuts you off, he spits you out, and you rise not, but fall down. You are weak and not strong, a coward and do not fight, blind and do not see. You creep away and do not appear. So speaks Horus, efficient in magic. Horus has slain the poison by his magic. He who mourned is in joy. Stand up, Neferit! Horus has restored him to life. Turn back, you snake. Flow out, you poison.[32]

To prevent the demon's evasion, he cursed it as a snake, a crocodile, a man, and a dog, ordering it to disclose its name. This he followed with threats to reverse the world order:

> Nurses will strike mothers. The small will curse the great. The earth will rise to smite the sky. The floods will not rise. Services will not be rendered in the temples.[33]

Then, as if afraid of his own words, or to assure their divine power, he added: "It is not I who say it. It is Isis who says it. It is Isis who repeats it. As to you, Neferit, daughter of Psametik, be not afraid."

Pouring water and natron over Djer-Hor's statue (Figure 8), he took up the consecrated fluid again in the trough at the base. He washed his hands and mouth with it, ordered the sick child to be bathed in it, and quietly departed, leaving the bedazzled assistants with the impression of having been visited by a ghost.

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31. Erman (note 17), 1, 9-2, 6.

32. Erman (note 17), vs. 6, 1-6.

33. Pleyte, W., and Rossi, F., 1869-1876, *The Torino Medical Papyrus* 131, 1-8, Leyden: Brill.

Figure 8. Djed-Hor the magician. On his statue, covered with magic writings, water was poured and collected in the hollow in the socle. This consecrated water was held to be curative. Late Period, Cairo Museum.

The barge of the Medical Services[34] was waiting on the embankment. Still thinking upon his decision to permit access to the conjuror, Psametik leaped over the deck and sat with Amose in the cabin. Had he been wise in allowing into his own household a magician, one of those he had fought all his life? How could he now sustain his views in front of the Pharaoh? He felt shaken, but immediately regained his composure when he saw a messenger running to meet him at the wharf and calling: "His majesty urgently needs you. Wesh-Ptah his architect is gravely wounded."

34. A debated interpretation of the title: Chief of the Two Sides of the Barge of the Physicians of the Royal Palace, found in a tomb at Saqqara.

Psametik jumped ashore and quickly ran by the stables (Figure 9) and the fields where the farmers were feasting the harvest (Figure 10), to the site where Wesh-Ptah lay prostrate, bleeding and unconscious before workmen, foremen, priests, high officials, and Pharaoh himself. A large block had fallen and had injured several persons, among them the architect.

Figure 9. Scenes of husbandry, Middle kingdom, Beni-Hassan.

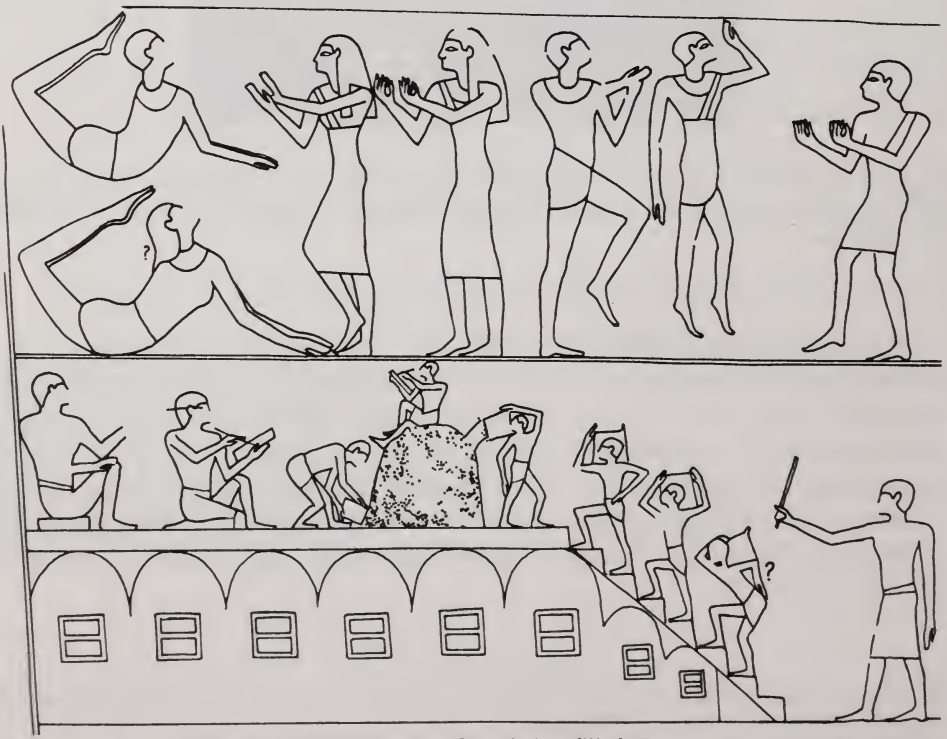

Figure 10. Harvest scene. Silos being filled. Dancers.

The physician bent over the man, palpated the wound, and said: "A man with a gaping wound in the head penetrating to the bone and smashing the skull. He discharges blood from his nostrils and ears; his neck is stiff, Amose," he added with an air of knowing the answer beforehand, "what do the books say?"

Amose unrolled a papyrus, and with hesitation read the verdict: "An ailment not to be treated." (S. 5)

"Your Majesty," said Psametik, "God grant you a long life. I can do nothing. The great god Amon will grant Wesh-Ptah an eternal ease in his realm. But Thot orders that I do not abandon him. I shall not bind him, but I shall moor him at his mooring stakes until the period of the injury passes."

With a tired gesture, Pharaoh, whose face betrayed the depth of his desolation, signified the end of the audience. Psametik continued his daily round.

He palpated a bleeding wound over a workman's eyebrows: "Close it with stitches, then bind it with fresh meat." (S. 10)

The next casualty was in great pain. His right shoulder was dislocated. He held his right arm close to his chest with his left arm. Ordering the workmen to place the patient on the ground, Psametik gripped the man's forearm, then twisted it right and left until he felt a sudden click. Finally he ordered Amose to apply the bandages.

Next came one who could not open his eye. It was swollen, red, and wet. Psametik opened the lids with a long probe, removed a splinter (Figure 11), and ordered an application of ground Byblos pigeon (Eb. 361).

Returning to the man who had been stitched, he said:

"The stitches are loose. Draw the lips together with linen bands so that they join each other." (S. 10)

A stonecutter was brought to him disfigured by a bent, swollen, bleeding nose. With a minimum of force, Psametik pushed the bones back into place. Then he took swabs and with them cleared the nostrils. Finally he prepared two stiff linen rolls, with which he supported the nose from outside. Then he bound it (S. 13).

The next nasal fracture was less fortunate. Blood was also running from this man's ears. To open the mouth was painful, and the man was speechless (S. 13). Psametik declined to treat him. Desperate at his powerlessness, he turned away whenever ears were bleeding and speech was gone. Another man he would not treat had been lying unconscious, paralyzed in all four limbs. His erect phallus was letting out sperm and urine. The physician declared:

"One having a dislocation of the vertebra of his neck. He is not to be treated." (S. 31)

He also declined to treat a man with breaks in the arm and ribs, and open wounds. The wide-open mouth of another attracted him. Recognizing a dislocated jaw, he asked the workman to sit down, placed his thumbs inside the mouth on the back teeth, gripped the jaws with the remaining fingers and, with a sudden and backward jerk, reset the bone in its place (S. 25).

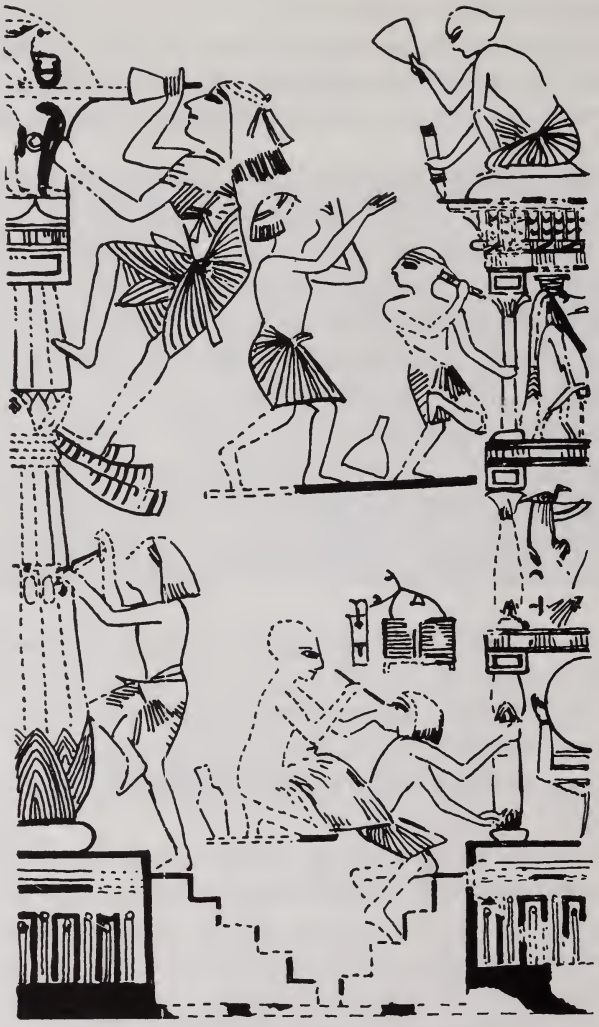

Figure 11. Medicine on the site of works of the architect Ipuy. New kingdom, Thebes. A heavy mall hits the foot of a workman. A healer or physician removes a splinter from the eye of another.

The next patient had great pain in walking. Psametik ordered him to lie down, extend his legs, then flex them again. When the man immediately contracted them both because of pain, Psametik diagnosed a sprain in the vertebral column (S. 48).

Amazed at the unyielding enthusiasm with which his master treated both slaves and workmen, Amose asked, "Why do you take such care of menial people while it would be a hundredfold more profitable to spend your time with the learned and the mighty?"

"Do not snub the poor, Amose! Workmen are the priests of the gods who, in the beginning of Time, replaced chaos with order, made wheat out of wild grain, and docile cattle out of wild beasts. Work is prayer in action, a perpetual re-creation. Otherwise, why would we spend money and time illustrating our tombs with it? Come, let us have some food before we meet with our colleagues. He only touched the meal (Figure 12) underlying a dictum that Psametik liked to repeat:

> Illness invades man because food is harmful
> Who eats too much bread will suffer disease
> Who drinks too much wine will go to bed with plaintive groans
> All illness in the limbs comes from excess of food.[35]

Figure 12. Geese, onions, lettuce, a joint, bread, jars. Early XVIIIth Dynasty. Cairo Museum.

35. Daumas (note 19) 423.

Then came the chiefs of the medical departments to present their reports — the Chief Physician of Upper and Lower Egypt, the Chief Physician of the Master of the Two Lands, the Chief Physician of the Palace, and the Chief Physician of the House of the Royal Spouse. Psametik, their Chief, took knowledge of the activities of the physicians of the Court, of the necropolis, of the quarries, of the armies, and of the various expeditions. He discussed results, equipment, and rations.[36]

Having terminated his offical day, Psametik then turned to some more personal matters. On his way home he entered a modest house for a second visit. A few days previously he had found the owner, a Chief Carpenter, with a perforating wound of the skull. The man shuddered when the wound was palpated. He could not talk, and when asked to look at his own shoulder, he had been unable to comply.

Now the man was feverish and covered with cold sweat. His neck was stiff. His wound was fetid, his face was drawn as if he wept, and he looked utterly exhausted. "Put a wooden tube padded with linen in his mouth," said the master to the man's wife. "Keep him sitting between bricks, and let us wait for the decisive point." (S. 7)

The wife did not look healthy. Alarmed at her pallor, Psametik questioned her. Bashfully, she uncovered her breast. Psametik palpated it and said: "There is no treatment, my dear woman."

After leaving the house he explained to Amose: "The swellings have spread, they are cold, they form no fluid, they do not secrete, and they bulge." (S. 45)

He could not end his day without paying a visit to the pygmies' headquarters, for he knew the favor that these midgets enjoyed. He remembered well the long letter of instructions that Pepi II had written to the governor of the Southern Province on hearing of his return from Central Africa with a pygmy. The king had ordered that the pygmy be closely watched lest any harm come to it, or it fall in the Nile, and he expressed the desire to see it living, prosperous, and healthy for the dances of the god and the "pleasure of My Majesty."

Psametik watched jewelers weighing gold and fashioning heavy necklaces such as the one with which Pharaoh had graced him (Figure 13). He saw Seneb, Keeper of His Wardrobe, Khnum (Figure 14), Master of the Dwarf Wardens; Taho, the Dancer who had performed in front of the Serapeum; the maids of the Royal Barges (Figure 15); the keepers of the pets; and all the rest of the miniature society that served and amused royalty and nobility.

The shadows were lengthening when he remembered his old friend Nefer who, he heard, had retreated for several weeks, half demented, into his home. Successive losses in his trade with the distant land of Punt had thrown him into deep depression. Psametik found him unshaven, uncouth, crouching in a corner

36. Jonokheere, F.: *Les Medicins de L'Egypt Pharaonique,* Bruxelles, Foundation Egyptologique Reine Elizabeth. 1958.

and singing a monotonous dirge:

Lo! my name is abhorred
More than the odor of carrion
More than the smell of fishermen.
Brothers are evil
Men are covetous
Gentleness has perished
A trusty friend is lacking.
Death is before me today
As the odor of myrrh
As a clearing of the sky
As when a man longs to see his house
After years of captivity.[37]

Figure 13. The physician Penthu receiving a collar of gold from a high dignitary deputizing for Pharaoh. Tell-el Amarneh. New kingdom.

37. Erman (note 6), 89, 94, 96.

Figure 14. Khnum-Hetep, chief of the dwarf wardens of Pharaoh's wardrobe. Old kingdom, Cairo Museum.

"What happened to your beautiful spirits, Nefer?"

"Laughter has perished. Strangers have come to Egypt. The towns are destroyed. The Nile is in flood, yet none ploughs. No one knows what happens in the land, and men go to plough with shields. Many are buried in the river because plague has spread; the crocodiles are glutted. There is no man of yesterday, for he who had no sandals now possesses riches. Gold, lapis-lazuli, silver, torquoise, hang about the necks of slave girls. But noble ladies say: 'Would that we had something to eat!' "[37]

"Things are not so bad, Nefer. Better days will follow. It is good when ships sail upstream, when the net is drawn over birds, when hands build pyramids and dig ponds, when beds are stuffed and headrests are protected with amulets. What you need is in your house, the corn measure runs over, you have your plot of land, provisions are in your storehouse. Be glad, dress in fine linen, put myrrh on your head, and let not your heart grow faint. None can take his goods with him.[38] Let us have a merry cup together."

38. Erman (note 6), 128-133.

Figure 15. The dwarf maid of Tutankhamen. Tutankhamen's treasury. Cairo Museum.

Re's barge was sinking in the river when Psametik returned home. A sudden pain had gripped his chest as he anxiously thought of what was waiting for him. Unexpectedly, he was met with smiles. Neferit had come back to her mind, adorned her head with a lotus wreath and was smelling a lotus (Figure 16). The slaves were singing at the harper's strings. The nightmare had dissolved.

"Return to the House of Life, Amose. I need rest. In spite of Min's herb, pain has gripped me in my breast and my arm. Death threatens me." (Eb. 194)

Amose departed, but in the sadness of his heart, he left two written sherds with which he had been playing. Psametik started a gesture to recall him but, on second thought, picked them up to review his pupil's work. His attention was immediately captured by a girlish handwriting:

Figure 16. An elegant princess smelling a lotus. New kingdom. Cairo Museum.

> My brother, it is a pleasure to go to the pond to bathe in your presence that I may let you see my beauty in my wet tunic. Come and look at me. If you desire to caress my thigh, my breast will (welcome) you. Will you go away to dress? I have a cloth. Will you go away because you are thirsty? Take my breast. Fairest one, my desire is to love you as your wife. If my elder brother is not with me tonight, I am like one in the grave.

The other sherd, written in Amose's hand, read:

> The love of my sister is upon yonder side; a stretch of water lies between us and a crocodile waits on the bank. But my love is a water spell. I tread upon the flood and the water is like land to my feet. My arms are open wide to embrace her. If I kiss her and her lips are open, I am happy even without beer. Ah, would I were her handmaid, then I would behold her limbs. Ah, would I were the washerman, I would wash out the urgents on her clothing...[39]
> I shall lie down sick. My neighbors will enter to see me. If my sister comes with them, she will put to shame the physicians, for she knows my illness.[40]

When Amose came back, the moon was shining on a sheet of purple and silver. The pupil sat by his master and asked:

"Master, I read today many expressions too antiquated for my youthful eyes.[41] Your wisdom will enlighten me."

As Amose read, Psametik made short, pithy comments:

"This is really effective; I have tried it many times (Eb. 1). A crushed vertebra of his neck: this means that one vertebra has fallen into the next, one penetrating the other (S. 33). Perforating the skull: his skull suffered a break like a puncture of pottery (S. 3). Moor him at his mooring stakes: it means putting him on his customary diet, without administering a prescription (S. 3). Until he has reached a decisive point: it means until you know whether he will live or die (S. 4). He walks shuffling with his sole: he walks with his sole dragging when his sole is feeble and turned over, and the tips of his toes are contracted to the ball of the sole, and they walk fumbling to the ground." (S. 8)

Amose finished reading long after Re, the Sun had sunk into the bosom of his mother, Nout, the Sky. A moist cold had risen from the river, causing Amose to sneeze. Smiling, Psametik told him:

"Retire, now, Amose, There is no need for any physician to treat your cold. The fair one knows your illness."

Amose blushed and hurriedly picked up the tell-tale potsherds. Turning towards the West, Psametik raised his hands in prayer:

> You are disappearing from my sight, my master
> I have spent the years that passed in beauty and reached old age in peace
> Accept me among your retinue so that the gods might say:
> Welcome to you, praised of the gods.

And he slowly stooped over on his couch, from which he never rose again.

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39. Erman (note 6), 243-244.
40. Erman (note 6), 245.
41. The medical papyri are full of expressions that had become archaic when they were recopied around 1500 B.C. Explanatory glosses were then added, and these have helped modern commentators. These glosses are the subject of the next paragraph.

Annotated Bibliography of Paleopathology: 1970-1979
Part II, D-J

MICHAEL R. ZIMMERMAN

D

123. **Dalton, H. P., Allison, M.J. and Pezzia, A.** 1976. The documentation of communicable disease in Peruvian mummies. *Med. Coll. Va. Quart.* 12:43-48.

The authors summarize their experience with a variety of infectious and communicable diseases discovered in Peruvian mummies dated at 700 to 1600 A.D. The diseases convincingly demonstrated and illustrated are tuberculosis, bacterial and fungal infections of the skin and lungs, bacterial meningitis, hookworm infestation of the intestine, and lupus erythematosus.

124. **Damell, D. and Modin, M.** 1979. Another look at the Vikings. *Archeology* 32:15-21.

Agricultural settlements near Stockholm dating back to the Viking age have been investigated in recent years. Numerous Viking grave fields containing cremated bodies of as many as 40 to 50 individuals have been found. In 1974, in the Parish of Fresta, a Nordic burial ground was discovered with an unusual burial dating to the Vendel Period (550-800 A.D.). Two unburnt male skeletons were found lying head to foot in a burned layer. They had been beheaded before being placed face down in the funeral pyre, which contained several animal and human bones, a pearl, and small metal fragments. This find leaves many questions for future investigation.

125. **Daniels, F., Jr. and Post, P. W.** 1970. The histology and histochemistry of prehistoric mummy skin. In: *Advances in Biology of Skin, vol. X: The Dermis,* eds. W. Montagna, J.P. Bently and R.L. Dobson, pp. 279-292. New York: Appleton-Century-Crofts.

Human skin is well preserved by drying, boiling and smoking as seen in Indian scalps, shrunken heads, and bodies buried in dry sand. Epidermal cells and fibrous components are particularly well preserved, and special stains and polarizing microscopy are useful in studying this material. Estimates of the degree of cutaneous pigmentation are feasible, and, in specimens of sufficient antiquity, may have implications for the study of human evolution.

126. **Darby, W. J., Ghalioungui, P. and Grivetti, L.** 1977. *Food: the Gift of Osiris.* London: Academic Press.

This large, two-volume work is an attempt to identify and discuss all the foods known and used by the ancient Egyptians. The second chapter deals with the nutritional state of ancient Egyptians; it considers overeating, undereating, famine, and vitamin deficiencies.

127. **Dastugue, J.** 1959. A prehistoric cranial aperture. *Bull. Ste. Anth. Paris* 10:357-363.

One of the earliest known trephinations comes from the epipaleolithic people of Taforalt (East Morocco). The opening is small, but the edges are typical and show complete healing. An incomplete trephination was found on another piece of skull from the same bed.

128. **Dastugue, J.** 1960. Pathology of some Neanderthals. VIth Intern. Congr. Anth. and Ethn. Sc. Paris.

The skeletons of La Chapelle aux Saints, La Ferrassie, Neanderthal, have been examined. Many lesions were found, among which the most interesting is the well known lesion of the Neanderthal's elbow. The author concludes that the lesion was a sequel of a Monteggia fracture.

129. **Dastugue, J.** 1962. Pathology of Taforalt men. La Necropole epipaleolithique de Taforalt, 132-158.

The epipaleolithic people of Taforalt (East Morocoo) were affected by various diseases. Traumatic injuries were rare, chronic lesions of joints and vertebrae were numerous. The author concludes that the Taforalt people were quiet and sedentary.

130. **Dastugue, J.** 1967a. Pathology of Cro-Magnon. *L'anthrop.* 71:479-492.

This is an exhaustive review of the skeletons obtained from Cro-Magnon caves. Special attention was paid to the lesions of the so-called "le vieillard" skeleton. The author concludes that these are due to a single disease, actinomycosis.

131. **Dastugue, J.** 1967b. The pathological skulls of Aksha. *Aksha* 3:159-171.

Aksha is a Meroitic cemetery in Nubia from which 16 skulls, 7 male and 9 female, were found to show pathologic change. Eight bear cup-shaped lesions, which are considered to be incomplete and perfectly healed trephinations.

132. **Dastugue, J.** 1969. Pathology of Chancelade. *L'anthrop.* 73:247-252.

The single skeleton of Chancelade shows evidence of several diseases: a healed fracture of the right temporal bone, a traumatic dislocation of the right shoulder, and various chronic articular lesions. A careful study of a foot shows typical hallux valgus (thought by Testut to be a prehensile toe).

133. **Dastugue, J.** 1970. Pathology of Columnata. *Mem. du C.R.A.P.E.* 15:121-126.

Columnata is a mesolithic people of northern Africa. Among the pathologic cases the most remarkable is a severe fracture of a female pelvis with total crushing of the sacrum and paralysis of the lower limbs. The sufferer lived long enough for her fractures to heal. Such a survival undoubtedly required effective assistance from her entourage.

134. **Dastugue, J.** 1973a. *Diagnosis of Ancient Trepanations.* Lyon: Colloque de Paleopathologie.

The author's purpose is to emphasize the specific features of complete or incomplete

trephinations, healed or unhealed. In each case the diagnosis is based on careful gross examination of the skull rather than on radiology or histology.

135. **Dastugue, J.** 1973b. Pathological or trephined skulls from northern Africa. *L'anthrop.* 77:63-92.

Most of these protohistoric skulls show evidence of trephination, complete and healed or incomplete and unhealed. The remaining skulls show a variety of lesions. There was one case of biparietal thinning.

136. **David, A. R., ed.** 1979. *The Manchester Museum Mummy Project.* Manchester: Manchester Museum.

This beautiful and copiously illustrated volume catalogs and describes the mummified human and animal remains held in the museum. Garner reports on the experimental mummification of rats (consolidating previous studies by Lucas and Sandison). An officer of the Manchester police describes the method of taking fingerprints from desiccated bodies. Isherwood et al. give an elegant illustrated report on the radiology of the material, including the potentially valuable use of computer tomography. Leech extends his work in dental paleopathology. Tapp details the unwrapping of Mummy 1770 and presents the results of light and electron microscopy. Curry shows fine electon micrographs of the associated insects, and there is a useful summary of the uses of analytical electron microscopy. Studies of the wrapping material go into the realms of advanced chromatography, and there is an authoritative account of the textiles. Hedge and Newton provide radiocarbon dating and suggest that there is a difference of more than a millennium in the dates of Mummy 1770 and its wrappings. R. Neaves, the artist, presents reconstructions of the likenesses of 1770 and of the two brothers studied by M. Murray in 1906. This book is an essential addition to the library of all scientists interested in archeology, Egyptology, and paleopathology.

137. **David, R., ed.** 1978. *Mysteries of the Mummies.* New York: Scribner.

This profusely illustrated short book describes the study of 17 human and 22 animal mummies in the Egyptological collection of the Manchester Museum. An introductory section reviews Egyptian geography, history and social life, and our knowledge of mummification. The major part of the book is devoted to the examination of the mummies, including radiologic studies, dissection with light and electron microscopy, dental examination, study of insects, and reconstruction of faces and fingerprints. Diseases diagnosed include antracosilicosis, pleuritis, pericarditis, strongyloidiasis, Guinea worm infestation, cerebral infarction, possible hepatic fluke infection, dental attrition and trauma, deviation of the nasal septum and mandibular dislocation. As the mummies were not well preserved, and one had been rewrapped more than a millennium after death, the remarkable amount of diagnostic material found is a tribute to the team assembled for the study. Written in an easily readable popular style, the book contains little detail and no references. It is to be hoped that the findings will be reported in greater detail in scientific periodicals.

138. **De La Calle, M.R.** 1975. *Estudio Antropológico de Dos Momias de la Cultura Paracas.* Ciencias, Series 9, antropologia y prehistoria, No. 3. (Anthropological study of two mummies from the Paracas culture).

Two Peruvian mummies from the Paracas culture, now housed in a museum in Cuba, were examined. One, a male aged 40 to 45 years, presented an unfinished circular trephine. X-ray examination revealed lumbar osteoarthritis and an impacted third molar. The other, a female aged 30 to 35 years, was poorly preserved and showed thoracolumbar osteoarthritis. No histologic studies were done. The photographs are of poor quality.

139. **DeVasto, M. A.** 1976. The percentage of calcium and phosphorus in human bone as diagnostic of severe hypothyroidism. *Yearbook Phys. Anthropol.* 19:338-346.

Original biochemical data indicate that the calcium content of bone from 10 known Swiss cretins is significantly greater than the amount from 6 noncretinous East Indians. It is suggested that an elevated calcium content in bone is diagnostic of severe hypothyroidism, when supported by additional morphologic or other evidence.

140. **Dogo, G.** 1974. The saint's hand. *J. Trauma* 14:9-19.

A study of the mummified hand of St. Vincent, who died in 304 A.D., led to the conclusion death was due to torture by roasting. As necrotic tissue was well demarcated, death was estimated to have occurred from 9 to 12 days after the torture.

141. **Drutz, D. J. and Catanzaro, A.** 1978. Coccidioidomycosis: part II. *Am. Rev. Respir. Dis.* 117:727-771.

Clinical features of infection with the fungus *Coccidioides immitis* (valley fever) are presented. Interest lies in the occupational exposure of archeologists working in the American southwest. There is an excellent summary of frequency and types of bones affected, with the differential diagnosis from tuberculosis.

142. **Dubinin, V. B.** 1948. Nakhozhdenie pleistotsenovich vshei (anoplura) i nematod pri issledovanii trupov Indigirskikh iskopaemikh suslikov. [The occurrence of Anoplura and nematodes in the carcasses of fossil susliks at Indigirisk.] *Dokl. Akad. Nauk. SSSR* 62:417-420.

The mummified bodies of 3 susliks *(Citellus sp.)* found buried in the permafrost of quaternary deposits (12.5 meters deep, 10-12,000 years B.C.) in a valley in the USSR were examined. Nematodes found in the vermiform appendix of one animal were identified as of the genus *Syphacia,* resembling *S. obvelata.* Anoplurid lice were also found.

143. **Dubinina, M. N.** 1972. Nematoda Alfortia edentatus (Loos, 1900) iz kishechnika verkhnepleistotsenovoi loshadi. [The nematode *Alfortia edentatus,* Looss 1900, from the intestine of an upper Pleistocene horse.] *Parazitologiia* 6:441-443. (USSR).

Several nematodes were found in the intestine of a horse preserved in permafrost in Siberia. The age of the horse is estimated at 32 to 33,000 years B.C. The nematode appeared entirely similar to modern forms.

144. **Duncan, H.** 1979. Osteoarthritis. *Henry Ford Hosp. Med. J.* 27:6-9.

The pathophysiology of this ancient and common form of arthritis is reviewed.

145. **Dunn, F. L.** 1968. Epidemiological factors: health and disease in hunter-gatherers. In: *Man the Hunter,* eds. R.B. Lee and I. DeVore, pp. 221-224. Chicago:Aldine.

Among other causes of mortality and disease, the incidence and epidemiology of parasitic infection in modern hunter-gatherer groups is discussed in relation to the diverse ecologies of different groups.

146. **Dunn, F. L.** 1970. Natural infection in primates: helminths and problems in primate phylogeny, ecology and behavior. *Lab. Anim. Care* 20:383-388.

Study of the host specificity of helminthic and other parasites of the living hominoids supports the hypothesis that the hominid line branched off from the line of African apes well after the pongid line had split in Asian and African branches, leading to *Pongo* and *Pan* respectively, and that the ancestral gibbons separated from the pongids before their split into African and Asian groups.

147. **Dunn, F. L. and Watkins, R.** 1970. Parasitological examination of prehistoric human coprolites from Lovelock Cave, Nevada. *Contrib. Univ. Cal. Archeol. Res. Fac.* 10:176-185.

More than 150 coprolites from this cave, dated ca. 700 to 1,500 A.D., were reconstituted in trisodium phosphate and examined for parasites. Apart from rhabditoid nematodes, probably of plant origin, ova of two presumed species of helminths were found. One was probably the egg of a fasciolid trematode; the other was not identified. Neither resembled ova of helminths commonly associated with man, and they may have been pseudo-parasites. Several specimens from other areas were also negative for parasites. The significance of this apparent relative absence of helminths from pre-Columbian cultures is discussed briefly.

148. **Dyson, S.** 1979. The mummy of Middleton. *Archeology* 32:57-59.

Renewed interest in an Egyptian mummy that was purchased in the 1880s for the Wesleyan University Museum, in Middleton, CT, brought to light another mummy long left in storage. Before complete unwrapping of the mummy, radiographic analysis identified the body as that of a male, in his late teens or early 20s, in good skeletal condition and with all teeth intact. No internal organs were seen. The mummy was unwrapped by a team of anthropologists and physicians, and a full photographic record was obtained. The body appeared to be that of a well-to-do person, five feet tall and of medium build. The viscera had been removed through an incision in the left flank and the brain through the left nostril. Archeological evidence suggests a date of 600 to 500 B.C. Tissue samples are being analyzed.

E

149. **Eckert, W.** 1974. The forensic sciences — anthropology's role. *Inform* 6:3-6.

The physical anthropologist helps greatly in the solution of forensic problems, including the question, "animal or human?" He copes with difficulties regarding time of death, age at death, sex, race, stature, and dating of bones.

150. **Eckert, W.** n.d. *International References on Paleopathology.* Wichita, KS: The International Reference Organization in Forensic Medicine.

An international listing of 850 titles through 1970. This bibliography, although not complete, has the advantage of keying each title to major subject headings as well as to major geographic regions. There are bibliographic errors and misspellings, and some of the journal abbrevations are difficult to decipher. Additional information can be obtained from Dr. Eckert, St. Francis Hospital, Wichita, KS 67214.

151. **Edynak, G. J.** 1976. Life styles from skeletal material: a medieval Yugoslav example. In: *The Measures of Man.* eds. E. Giles and J. Friedlander, pp. 408-432. Cambridge, Mass: Peabody Museum Press.

152. **El-Najjar, M. Y.** 1974. People of Canyon de Chelly: a study of their biology and culture. Ph.D. thesis, Ariz. State University.

Metric and non-metric cranial features, dental health, stature, skeletal lesions, and demographic aspects were studied in 249 prehistoric human skeletons from Canyon de Chelly and Canyon del Muerto, Arizona. Dating was A.D. 300-1,300.
Porotic hyperostosis was observed in more than half of the skulls; incidence was highest in children (88%) and adult females. The condition is attributed to iron deficiency anemia brought on by the inability to metabolize dietary iron properly. Except for a high incidence of antemortem loss of teeth, dental disease was no more frequent than in other southwestern Indian groups.

153. **El-Najjar, M. Y.** 1976. Maize, malaria and the anemias in the pre-Columbian new world. *Yearbook Phys. Anthropol.* 19:329-337.

Porotic hyperostosis was found to be significantly more frequent among maize-dependent groups than in groups not dependent on maize. The author dismisses the common European allegation that the lesion is related mainly to malaria. It is hypothesized that the lesion results from the nutritional properties of maize and the techniques used in processing it; these result in deficiences of iron and protein.

154. **El-Najjar, M. Y.** 1979. Human treponematosis and tuberculosis: evidence from the new world. *Am. J. Phys. Anthropol.* 51:599-618.

The history of these diseases is reviewed and nine new cases are reported. The author contends that both forms of disease originated in the old world, entered the new world with travelers across the Bering Sea land bridge, and were endemic in the pre-Columbian new world. Relative immunity to endemic disease is invoked to explain the rarity of skeletal lesions in prehistoric populations.

155. **El-Najjar, M. Y., Desanti, M. V. and Ozebek, L.** 1978. Prevalence and possible etiology of dental enamel hypoplasia. *Am. J. Phys. Anthropol.* 48:185-192.

Comparison between living children and early twentieth century specimens in the Todd collection at the Cleveland Museum of Natural History showed striking differences in sexual and racial distribution over time. A significant modern decline in incidence is attributed to improved nutrition and to elimination of common childhood diseases.

156. **El-Najjar, M. Y. and L.-Robertson, A., Jr.** 1976. Spongy bones in prehistoric America. *Science* 193:141-143.

A well-preserved mummified child (ca. 1200 A.D.) was recovered in 1971 from Canyon de Chelly in northeastern Arizona. Striking calvarial changes were found. Microscopic, ultrastructural, and cytochemical studies confirm the diagnosis of porotic hyperostosis. Dietary iron deficiency is discussed as a probable cause in the American southwest.

157. **El-Najjar, M. Y., Lozoff, B. and Ryan, D. J.** 1975. The paleoepidemiology of porotic hyperostosis in the American southwest: radiological and ecological considerations. *Am. J. Radiol. Rad. Ther. Nucl. Med.* 125:918-924.

Porotic hyperostosis was observed in 34% of 539 crania retrieved from sites in Arizona and New Mexico. Commonly alleged causes of this lesion (malaria, hemoglobinopathies and hookworm) do not explain its occurrence in this area, and a hypothesis of nutritional anemia is advanced. In canyon-bottom sites, where the diet was heavily dependent on maize, which is low in iron and contains an inhibitor of iron absorption, significantly more crania showed porotic hyperostosis than was the case in sage plain sites, where the diet included ample animal protein rich in easily absorbable iron. In addition, canyon-bottom children, who were more susceptible to iron deficiency anemia, had a higher incidence of porotic hyperostosis than adults.

158. **El-Najjar, M. Y. and McWilliams, K. R.** 1978. *Forensic Anthropology: The Structure, Morphology and Variation of Human Bone and Dentition.* Springfield, Ill.: C.C. Thomas.

This book is apparently intended for students of anthropology who expect to work on skeletons obtained from archeological excavations. The book provides concise but broad information for the novice in osteology, includes the study of teeth, and also contains interesting, original and useful sections on epigenetic traits, on congenital malformations, and on sex differences in long bones. The bibliography is long and fairly complete, and includes some unusual items.

Unfortunately, errors are numerous. They range from obvious typographical oversights and misspellings (even of the names of major authorities) to errors in drawings and terms, and, rarely, in facts. Apparently the unrevised book was sent to the press without review by an outside expert in forensic anthropology.

From the strictly forensic standpoint there are omissions: estimation of time elapsed since death, effects of chewing by animals, cremation, and mass burial. All of these errors are small and are easily correctible in a future edition.

Much good new information has been brought together in the section on reconstruction of the individual from the skeleton (perhaps too much on stature from long bones). Intended for the anthropologist and the paleopathologist, the sections on non-metric traits and on congenital variations and anomalies are new, clear, well documented, and well illustrated.

159. **El-Najjar, M. Y., Morris, D. P., Turner, C. G., II et al.** 1975. An unusual pathology with high incidence among the ancient cliff-dwellers of Canyon de Chelly. *Plateau* 48:13-22.

The title of this article is misleading in that the text is concerned with the description of a single burial from Antelope House Ruin, Canyon del Muerto, Arizona, dated to ca. 1200 A.D. The subject, a 3-year-old child, was interred lying on a cradle board. Apparently death was associated with anemia, since extensive porotic hyperostosis was present. A short review of the literature on pathogenesis of this lesion in modern patients is included. More detailed studies are mentioned, and suggest that the pathologic condition was endemic to this area.

160. **El-Najjar, M. Y., Ryan, D. J., Turner, C. G., II et al.** 1976. The etiology of porotic hyperostosis among the prehistoric and historic Anasazi Indians of southwestern United States. *Am. J. Phys. Anthropol.* 44:477-488.

El-Najjar and coworkers posit the following set of hypotheses: 1) porotic hyperostosis is a non-specific change reflecting increased activity of bone marrow; 2) porotic hyperostosis will be present only if marrow hyperplasia begins when the bones of the skull are malleable, and it persists long enough to produce the skeletal changes; 3) because children's bones are thin and incompletely mineralized, space for production of marrow is limited, and because of the child's high need for iron, porotic hyperostosis is found more commonly in children than in adults and adolescents; 4) populations whose dietary staple either is deficient in iron or interferes with the absorption of iron will have more iron deficiency anemia, more bone marrow hyperplasia, and more porotic hyperostosis than those whose diets include adequate amounts of iron; and 5) because repair and maturation of bone have not been described adequately in porotic hyperostosis, no specific hypothesis about its manifestations in adults can be made.

161. **Elzay, R. P., Allison, M. J. and Pezzia, A.** 1977. A comparative study on the dental health status of five pre-Columbian Peruvian cultures. *Am. J. Phys. Anthropol.* 46:135-140.

Gross examination of 101 mandibles of individuals from five pre-Columbian southern Peruvian cultures was done in order to assess dental health. Frequencies of antemortem dental loss, attrition, osteitis, and caries are presented for each cultural group (without sex or age differentiation). A few tentative hypotheses are presented to explain some differences between the groups, but are generally left unexplored in terms of either contemporary clinical knowledge or archeological context.

162. **Ericksen, M. F.** 1973. Age-related bone remodeling in three aboriginal American populations. Ph.D. thesis, George Washington Univ.

Age-related bone remodeling is investigated, by radiologic and microscopic techniques, in Eskimo, Pueblo, and Arikara skeletal populations. The data demonstrate population and sex differences in remodeling. Dietary differences as well as environmental factors apparently contribute to these trends.

163. **Ericksen, M. F.** 1976. Cortical bone loss with age in three native American populations. *Am. J. Phys. Anthropol.* 45:443-452.

Populations of Eskimos, Pueblos, and Arikaras were studied from archaeological evidence for age-related bone loss in the humerus and femur. Bone loss in the humeral and anterior femoral cortices usually began before middle age. Loss in females began earlier and was two to three times greater than in males. The weight-bearing medial and lateral femoral cortices showed less sexual but more interpopulation differences in terms of bone loss with age. It was concluded that the latter regions were more affected by environmental factors (perhaps nutrition or physical activity) than the humerus and anterior femoral cortex, which are more subject to tensile stress.

164. **Ericson, J. E., Skirahata, M. S. and Patterson, C. C.** 1979. Skeletal concentrations of lead in ancient Peruvians. *N. Engl. J. Med.* 300:946-951.

Lead levels in 1,600-year-old Peruvian bones were found to be 1/1,000th of the levels encountered in modern Americans and Englishmen. This difference is attributed to modern overexposure to industrial lead. The important point is made that the natural metabolism of lead in humans has not been evaluated because of contamination of laboratory materials by lead.

165. **Evans, W. E. D.** 1963a. Adipocere formation in a relatively dry environment. *Med. Sci. Law* 3:145-153.

Adipocere is common in female bodies after long inhumation in a dry environment. It was previously thought that extraneous water was necessary in the formation of this material. Pre-inhumation conditions such as warm weather, fog, or haze favor the formation of adipocere, which occurs in the subcutis and other sites of body fat.

166. **Evans, W. E. D.** 1963b. *The Chemistry of Death.* Springfield, Ill.: C.C. Thomas.

Chapter seven reviews Egyptian methods of mummification, and techniques used for rehydration and microscopic examination of mummified tissues. The findings of several investigators are summarized. The formation of adipocere is discussed.

F

167. **Facchini, F. and Pettener, D.** 1977. Chemical and physical methods in dating human skeletal remains. *Am. J. Phys. Anthropol.* 47:65-70.

Physicochemical alterations in specimens of bone from 30 to 3,500 years old were studied by the benzidine reaction, ultraviolet fluorescence, measurements of specific gravity, and supersonic conductivity. Changes were found to occur within the first 1,000 years after death, and are independent of the environment. The possible application of these techniques is discussed.

168. **Farooq, M.** 1966. *Bilharziasis: Historical Development. World Health Organization, Expert Committee on Bilharziasis (Epidemiology and control).* BILH/WP/66.1 Geneva: WHO.

Two introductory pages summarize knowledge about schistosomiasis in ancient Egypt. The hieroglyphic expression *aaa* designated not a disease but an important symptom, hematuria. This explains why the sign for "phallus" is used as a determinant for the word.

169. **Farrell, E.** 1973. Dentistry's past and future meet in Egypt. *JADA* 86:553-562.

A comparison of cephalometric data from mummified and modern Nubian populations supports the opinion that human faces are becoming smaller at a greater rate than are the teeth. The result is dental crowding. Radiographic studies of the Egyptian pharaohs and their queens provided information on their identification, as well as revealing evidence of arthritis, atherosclerosis, scoliosis, fractures, and dental diseases. One unwrapped mummy showed evidence of poliomyelitis, another had had smallpox. This article is a review of the work of James Harris.

170. **Finnegan, M.** 1978. Human skeletal remains from Bradford House III, Site 5J52, Jefferson County, Colo. *Plains Anthropol.* 23:221-234.

Thorough study of an adult male from the archaic period revealed anomalous ribs on the seventh cervical vertebra. There was associated disuse atrophy of the left humerus, suggesting that the left arm was partly impaired by impingement of the left cervical rib on the brachial plexus.

171. **Finnegan, M. and Frayer, D.** 1971. Current research in paleopathology. *Colo. Anthropol.* 3:2.

Two samples were considered: a group of Florida Indians (35 males and 15 females), and another of Alaskan Coast Eskimos (29 males and 26 females). Osteoarthritis, mainly in the cervical and lumbar regions, was found in a high proportion of the bodies examined.

172. **Flinn, L., Turner, C. G., II and Brew, A.** 1976. Additional evidence for cannibalism in the southwest: the case of LA 4528. *Am. Antiq.* 41:308-318.

About 950 A.D., eleven persons of a small Anasazi settlement on Burnt Mesa, north of the San Juan River, New Mexico, were butchered, mutilated, and possibly roasted. The mixed remains were left strewn over a pithouse floor. Almost all the bones were smashed and splintered. Some were burned, some show cuts, and all exhibit greenstick fractures. Cannibalism is the most probable explanation of the patterned destruction. Starvation or necessity, rather than a ritual or religious reason appear to be the best explanations of the cannibalism. A summary of other putative cases of cannibalism in the American southwest concludes the article.

173. **Frost, H. M. and Kent, W. U.** 1967. Histological measurement of bone formation rates in unlabelled contemporary, archeological and paleontological compact bone. See Wade, 1967, pp. 9-22.

Annual bone formation rates in compact bone were found by measuring osteon population densities, multiplying by the mean osteon cross section area, and dividing by the age span during which the osteons were deposited. It is implied that such a technique could be utilized to study the effects of different pathologic processes on rates of bone formation, and could be extended to unknown cases as a possible aid in diagnosis.

174. **Fry, G. H.** 1970. Preliminary analysis of the Hogup Cave coprolites. In: *Hogup Cave,* by C.M. Aikens, App. III, pp. 247-250. Salt Lake City: Univ. Utah Anthrop. Papers, No. 93.

A thorough analysis of vegetable and other remains present in 30 coprolites of probable human origin was conducted. In addition, 75 specimens were examined for ova and parasites. Positive findings included ova of a thorny-headed worm (phylum Acanthocephala) and of the pinworm *(Enterobius vermicularis).*

175. **Fry, G. F.** 1974. Ovum and parasite examination of Salts Cave paleofeces. In: *Archeology of the Mammoth Cave Area.* New York: Academic Press.

A find of ascaris is reported. Since archeological provenience is lacking, the author warns that the specimen may well be modern. Hookworm, pinworm, and whipworm have all been found in pre-Columbian America, but ascariasis cannot as yet be regarded as a pre-Columbian disease.

176. **Fry, G. F.** 1976. Analysis of prehistoric coprolites from Utah. *Anthropol. Papers Univ. of Utah* 97:1-45.

Although all the important finds have been published elsewhere, this work is a model to be followed by those who study coprolites. The presentations of data and photographs are complete, and the most ancient human parasites are reported, including tapeworms, pinworms, and lice. Some specimens were as old as 10,000 years. Also included are descriptions of foods and analyses of pollen.

177. **Fry, G. F.** 1978. Prehistoric diet at Danger Cave, Utah, as determined by the analysis of coprolites. *Anthropol. Papers Univ. of Utah* 99:107-123.

A detailed description of the plant and animal foods found in coprolites from the end of the Ice Age to the time of Christ. Diet in this area seems to have been quite stable, with some minor fluctuations and a gradual increase in complexity.

178. **Fry, G. F. and Hall, H. J.** 1969. Parasitological examination of prehistoric human coprolites from Utah. *Utah Acad. Proc.* 46:102-105.

193 coprolites were examined for parasites. The trisodium phosphate method proved more satisfactory than sodium hydroxide rehydration. Formalin-ether concentration was more satisfactory than zinc sulphate concentration. In Danger Cave, approximately 9% of 67 samples taken from 4 levels corresponding to a time span from 9500 B.C. to 20 A.D. contained acanthocephalan ova. All but one specimen contained large numbers of ova. Much lower percentages of infection were seen in specimens from Hogup Cave and Glen Canyon. The parasite was probably *Moniliformis clarki*, acquired by ingestion of insects or rodents. Such infections would probably have had great effect on individual health and may have been lethal. Pinworm ova were found in 2.6% of all specimens; the true incidence of infestation is suspected to be much higher.

179. **Fry, G. and Hall, H. J.** 1975. Human coprolites from Antelope House: preliminary analysis. *Kiva* 41:87-96.

Forty-six coprolites of probable human origin were analyzed for diet and parasites. All the specimens came from two rooms of a prehistoric Anasazi cliff-dwelling in Canyon del Muerto, Arizona and are dated between 1075 and 1140 A.D. Seven specimens (15%) were positive for pinworm.

180. **Fry, G. F. and Moore, J. G.** 1969. *Enterobius vermicularis:* 10,000-year-old infection. *Science* 166:1620.

Pinworm ova were found in human coprolites from Hogup and Danger Caves in western Utah. The caves were inhabited from 10,000 B.C. to 1400 A.D. The oldest coprolite containing *E. vermicularis* was radiocarbon dated at 7837 B.C., the earliest known record of this parasite in association with man.

G

181. **Gaballah, M. F., El-Rakhawy, M. T. and El-Eishi, H. I.** 1974. Craniological studies of Egyptians at various periods. *Ains Shams Med. J. (Cairo)* 25:417-423.

A brief historical summary of Egyptian craniology.

182. **Gaines, A. M. and Handy, J. L.** 1975. Mineralogical alteration of Chinese tomb jades. *Nature* 253:433-434.

Ancient Chinese jades sometimes have white chalky areas which invade the otherwise firm polished surfaces. The authors attribute this change to proximity to decomposing bodies. During the Han dynasty, pieces of jade were placed in each of the body orifices to ward off decay; ironically, the corpses caused decay of the jade.

183. **Gardner, W. A. and Griffin, C. N.** 1971. A paleopathologic exercise — the Charleston Museum mummy. *J. S.C. Med. Assoc.* 67:269-270.

Radiologic re-examination of an Egyptian mummy from the Roman period (Second century A.D.) excluded a previous diagnosis of ochronosis, emphasizing that care should be taken in making paleopathologic diagnoses.

184. **Gass, H. H.** 1971. A skull from Spruce Swamp. Case of cranial dysraphism? *Science* 171:1268.

See Stewart, 1975.

185. **Gejvall, N. G. and Henschen, F.** 1971. Anatomical evidence of pre-Columbian syphilis in the West Indian Islands. *Beitr. Pathol.* 144:138-157.

Seven pre-Columbian skulls from Puerto Rico and Haiti are described. The skulls have been in Sweden since 1857. An eighth skull was given to Rudolf Virchow in 1894. He published his observations in 1896, suspecting syphilis, but with some reservations. Five of the seven skulls show periostitis and osteitis, with necrosis and perforations of the calvarium, probably of syphilitic origin. Radiocarbon dating puts two of the skulls at A.D. 1630 and 1480, ±100 years. As very few syphilitic lesions have been found in the West Indies, the authors conclude that this find supports the belief that Europe was contaminated with syphilis after the return of Columbus.

186. **Gerszten, E., Allison, M. J., Pezzia, A. et al.** 1976. Thyroid disease in a Peruvian mummy. *Med. Coll. Va. Quart.* 12:52-53.

A case of goiter with calcification in a mummified Peruvian who died about 94 B.C. is presented. Enlargement of the gland and other abnormal changes in the tissues support the tentative diagnosis of goiter with hypothyroidism.

187. **Gerszten, E., Munizaga, J., Allison, M. J. et al.** 1976. Diaphragmatic hernia of the stomach in a Peruvian mummy. *Bull. N.Y. Acad. Med.* 52:601-604.

This mummy, dated to about 1550 A.D., early in the Spanish conquest, came from the cemetery of Pica, an area in the Chilean province of Tarapaca, which was once part of the Incan empire. The man had been a silver miner and had large deposits of silica and silver ore in his lungs. The stomach was dilated and a portion of the fundus protruded into the thorax through the cardiac hiatus. The hernia may have been caused by heavy work in the mines.

188. **Ghalioungui, P.** *The House of Life: Magic and Medical Science in Ancient Egypt.* Amsterdam: B.M. Israel.

This fine book is valuable both to the neophyte for its simplicity and to the expert for the numerous pictures of diseases, instruments, childbirth and texts. The medical papyri are listed, with a short description of each. The chapter on mummification is short but adequate.

189. **Giacometti, L. and Chiarelli, B.** 1968. The skin of Egyptian mummies: a study in survival. *Arch. Dermatol.* 97:712-716.

Fragments of skin from predynastic mummies showed preservation of the epidermis,

collagen fibers of the dermis, and hair shafts. Nuclear detail and fat cells were not preserved. Structures resembling erythrocytes were seen in the scalp; these were subsequently determined to be yeast cells.

190. **Gilbert, R. I., Jr.** 1975. Trace element analyses of three skeletal Amerindian populations of Dickson Mounds. Ph.D. dissertation: Univ. of Massachusetts.

Abstract unavailable.

191. **Glob, P. V.** 1969. *The Bog People: Iron-Age Man Preserved.* trans. R. Bruce-Mitford. Ithaca, N.Y.: Cornell University Press.

Many 2,000-year-old bodies have been found well preserved in European bogs. This book presents the results of paleopathological investigations, in an archeological context.

192. **Goff, C. W.** 1967. Interesting survivals of antiquity. *Am. J. Orthop.* 9:70-71.

X-rays of two Egyptian mummies, a brother and sister of ca. 1,500 B.C., showed scoliosis. A third mummy had leg fractures, presumably caused by embalmers forcing the body into too short a coffin.

193. **Goldstein, M. S.** 1970. The paleopathology of human skeletal remains. In: *Science in archeology,* eds. D. Brothwell and E. Higgs, pp. 480-489. New York: Praeger.

A general survey of the literature on skeletal paleopathology prior to 1970, with 56 references.

194. **Goldstein, M. S., Arensburg, B. and Nathan, H.** 1976. Pathology of Bedouin skeletal remains from two sites in Israel. *Am. J. Phys. Anthropol.* 45:621-640.

The skeletons of 106 persons from Tel Harif and 90 individuals from Tel Shava, two sites in the Israeli Negev dating to ca. 200 B.C., were examined. Data are presented by site, sex, and kind of disease; epidemiological inferences can be drawn. Cranial lesions include depressions (trauma?), palatal exostoses, cribra orbitalia, cholesteatomata, atlanto-occipital synostoses, palatal cyst, fractures, and dental diseases. Postcranial lesions include fractures, arthritis, osteoporosis, and osteomyelitis. Many shafts of long bones, especially the tibia, were found to be swollen; this change was attributed to bejel. Many vertebral anomalies were noted. The authors argue that the people were well adapted to their desert homeland, despite the high frequency of skeletal lesions.

195. **Gomez, J.** 1973. Paleoneurosurgery in Columbia. *J. Neurosurg.* 39:585-588.

The author describes three examples of probable trephination from Columbia, the first instances reported from this part of South America. Each of the surgical defects was located in the parietal regions. One skull exhibited evidence of primitive cranioplasty.

196. **Gooch, P. S.** 1975. *Helminths in Archeological and Prehistoric Deposits: Annotated Bibliography No. 9.* St. Albans, Herts., Engl.: Commonwealth Inst. of Helminthology.

Forty two references, covering 1910-1975, include nematodes from the intestine of a 33,000-year-old horse and a 44,000-year-old mammoth, both from the USSR. A Chinese cadaver from 2,000 years B.C. (see Wei, 1973) has now yielded *Trichuris* and *Enterobius* in addition to a schistosome, the pinworm being the earliest find outside of the Americas.

197. **Goodwin, R. A. and Des Prez, R. M.** 1978. Histoplasmosis. *Am. Rev. Respir. Dis.* 117:929-956.

Paleopathologic interest in this fungus infection lies in the multiple calcified nodules it may produce in the lung, which may persist in archeologic specimens. The review of the disease is current and comprehensive.

198. **Gordus, A. A., Maher, C. C. and Bird, G. C.** Human hair as an indicator of trace metal environmental exposure. Conference Proceedings, First Annual Trace Contamination Conference.

By means of neutron activation and flameless atomic absorption spectrophotometry, hair up to 200 years old was analyzed for 38 trace elements. Hair can be an accurate reflector of the intake of trace elements. This paper was given at a National Science Foundation conference at Oak Ridge National Laboratory. Copies may be obtained from the senior author, Dept. of Chemistry, University of Mich., Ann Arbor, MI 48109.

199. **Grabb, W. C., Hodge, G. P., Dingman, R. O.** et al. 1968. The Hapsburg jaw: *Plast. Reconstr. Surg.* 42:442-445.

See Hodge, 1977.

200. **Grady, M. A.** 1969. An osteological analysis of selected burials from the Rooney extension of 4-Sac-127, Sacramento, California. M.A. thesis: Sacramento State College.

This site, tentatively dated to the period 500 B.C. to 500 A.D., provides a skeletal sample of more than 150 individuals. A general survey reveals evidence of inflammation, arthritis, trauma, and neoplasms. No comparative data are given.

201. **Graham, E. E. and Burkart, J.** 1976. A preliminary analysis of antemortem tooth loss among the Fremont. *Am. Antiq.* 41:534-537.

A sample of 47 individuals from the Fremont culture, Utah, were examined for percent antemortem dental loss by sex and age. Females aged 31 to 50 years were found to have a much higher frequency of antemortem loss than males. The authors suggest either a dietary difference between the sexes or cultural factors which put heavy masticatory strain on females. It should be noted that the sample covers the broad span of 900 years.

202. **Grandjean, P., Nielson, O. V. and Shapiro, I. M.** 1979. Lead retention in ancient Nubian and contemporary populations. *J. Environ. Pathol. Toxicol.* 2:781-787.

Abstract unavailable.

203. **Gray, J. E.** 1973. Tutankhamun's postmortem. *Lancet* 1:259.

One of 6 letters to the editor of *Lancet* on reasons for the excessive mammary development that is shown on one of more of the gilded wood statuettes of the Pharaoh Tutankhamun. Several suggestions are based on historical and general clinical information. These include: possible adrenal tumor (Weller); possible Klinefelter's or Wilson's syndrome (Walshe); gynecomastia of genetic origin (Taitz, Gray); artistic convention (Swales); and complete absence of any disease that could be demonstrated or supported by examination of the embalmed body (Harrison).

204. **Gray, P. H. K.** 1967. Radiography of ancient Egyptian mummies. *Med. Radiogr. Photogr.* 43:34-44.

A radiographic survey of 133 Egyptian mummies in collections in Great Britain and Europe demonstrated osteoarthritis, Harris lines, occasional antemortem fractures, gallstones, and several other conditions. There was no evidence of tuberculosis, syphilis, leprosy, rickets, or malignant tumors.

205. **Gray, P. H. K.** 1970a. A case of osteogenesis imperfecta, associated with dentinogenesis imperfecta, dating from antiquity. *Clin. Radiol.* 21:106-108.

A radiographic and anatomic reconstruction of a diseased infant dated to the 21st Dynasty (ca. 1000 B.C.) from the necropolis of Beni Hassan, the site of an earlier Egyptian town on the east bank of the Nile.

206. **Gray, P. H. K.** 1970b. An account of a mummy in the County Museum and Art Gallery, Truro. *J. Egypt. Archeol.* 56:132-134.

An elderly Egyptian man, embalmed at some time between the end of the 21st and the beginning of the twenty-sixth Dynasties, was examined radiologically and showed dental attrition, many teeth missing, extensive calcification of costal cartilages, osteoarthritic changes in both knees, faint lines of arrested growth in the tibias, and evidence of a lesion in the L5-S1 disc.

207. **Green, S., Greene, S. and Armelagos, G. J.** 1974. Settlement and mortality of the Christian site (1050 A.D. - 1300 A.D.) of Meinarti (Sudan). *J. Hum. Evol.* 3:297-316.

This paper exemplifies the important new thrust in paleopathological studies which seeks to include demographic information and the interaction of biological and cultural variables as they relate to settlements and social structure. The combined use of life tables, reconstructed from cemetery data and archeologic analysis revealed the existence of age, sex, and mortality rate as factors determining the status of Meinarti individuals. Analysis of mortality also supported the archeologic analysis in demonstrating distinct periods of growth and decline in the Meinarti population.

208. **Greene, D. L. and Armelagos, G.** n.d. *The Wadi Halfa Mesolithic Population.* Amherst: Res. Rep. No. 11, Dept. Anthrop., Univ. Mass.

In this monograph the section on pathology reveals that most of the ills which beset this Sudanese population are referable to the stresses of daily living, such as osteoarthritis of the temporo-mandibular joint and vertebral column, severe dental abrasion, and rather common parry fractures. Other lesions were much less frequent.

209. **Gregg, J. B. and Bass, W. M.** 1970. Exostoses in the external auditory canals. *Ann. Otol. Rhinol. Laryngol.* 79:834-839.

Examination of 1,613 skulls from Indian burials in the Dakotas revealed 3.5% to have aural exostoses; almost half were bilateral. Detailed anatomic and statistical data are given. It is noted that Hrdlička, in examining a collection from the same area, had found a much higher incidence. The authors feel that Hrdlička was studying highly selected specimens rather than a cross-section of the population.

210. **Gregg, J. B. and Bass, W. M.** 1974. Exostoses in the external auditory canals. In: *Diagnosis and Treatment of Prevalent Diseases of North American Indian Populations.* pp. 137-142. New York: MSS Information Corp.

See Gregg and Bass, 1970.

211. **Gregg, J. B. and McGrew, R. N.** 1970. Hrdlička revisited: external auditory canal exostoses. *Am. J. Phys. Anthropol.* 33:37-40.

This paper presents the same argument as Gregg and Bass, 1970.

212. **Gregg, J. G., Provost, P. E. and Bass, W. M.** 1979. Pedagogy in paleopathology. *Plains Anthropol.* 24:29-34.

The authors summarize recent events in paleopathology and emphasize the need for standardization of pedagogic methods. They share their experiences as a multidisciplinary faculty in developing and presenting a formal course in paleopathology at the University of Tennessee since 1972. A Hippocratic approach is used to help the student understand the effects of normal and pathologic processes. Emphasis is placed on the relations between man and his diseases, culture, and environment. The four hour, upper-division course includes laboratory experience in the analysis of skeletal material. Students are expected to develop a detailed descriptive analysis, diagnostic interpretation, and summary of relevant references for assigned specimens. They are encouraged to use medical as well as anthropological resources. Plans for improving the program are included in the report.

213. **Gregg, J. B., Steele, J. P. and Holzhueter, A.** 1972. Roentgenographic evaluation of temporal bones from South Dakota Indian burials. In: *Health Problems of United States and North American Indian Populations,* pp. 122-131. New York, MSS Information Corp.

Four hundred and seventeen temporal bones removed from burial mounds of several Indian cultures were examined. About half showed altered development of mastoid air cells; no significant sex or cultural differences were found. There was no evidence of cholesteatoma, cancer, or other bone disease, or of surgical procedures. It is concluded that about half of the group had suffered from middle ear disease during life.

214. **Griffin, C. J.** 1978. The prevalence of the maxillo-septal syndrome in Anglo-Saxon and Romano-British skulls and foetal specimens. *Aust. Dent. J.* 23:171-177.

Forty-two of 73 premedieval British skulls and 3 of 10 fetal specimens showed this complex deformity at the junction of the nasal bones and the maxilla. Almost all of the specimens also showed a deviated nasal septum. The possible genetics and the clinical consequences of the lesion, including bronchial asthma, are discussed.

215. **Grmek, M. D.** 1974. Die Wirbelsäule im Zeitgeschehen. *Med. Welt.* 25:70-76. (The spinal column through history.)

An evolutionary and comparative anatomical view of the spinal column is taken as background for brief discussions of some vertebral lesions, such as spondylosis, synostosis, slipped disc, and Scheuermann's disease.

216. **Grmek, M. D.** 1975a. L'hyperostose poreuse du crâne, les anémies héréditaires et la paludisme en Grèce. *Ann. Econom. Soc. Civ.* 5:1152-1185. (Porotic hyperostosis of the skull, hereditary anemias and malaria in Greece.)

An extensive analysis based on modern epidemiological work, historical documents, and paleopathological evidence from bones and works of art.

217. **Grmek, M. D.** 1975b. Metodi nuovi nello studio delle malattie antiche. *S. & T.* 75:71-84. (New methods for the study of ancient disease.)

This article is largely concerned with the medical historian's approach to ancient disease and deals extensively with epidemic diseases such as plague. It also refers to paleopathologic material including lesions of treponematoses, leprosy, thalassemia, porotic hyperostosis and other diseases, with brief comments on some modern methods of study. These include electron microscopy, microradiography, serological tests, chemical analyses, solar orientation of burials, identification of intrusive insect remains, and Harris lines.

218. **Grmek, M. D.** 1975/76. La paléopathologie des tumeurs osseuses malignes. Proposition d'une classification à l'usage de l'ostéo-archéologie, revue des examples publiés et présentation de deux cas inedits. *Hist. Sci. Med.* 1:1-30. (The paleopathology of malignant bone tumors. Proposed classification for use in osteoarcheology, review of published examples and two new cases.)

This article merits attention for three reasons: it gives the first good description of two early medieval skulls, from Hinga and Montrichard, each with malignant perforations of the vault; it provides a catalog and a brief discussion of most of the known examples of early cancer; and it proposes a classification for describing the location and type of neoplasms. Dr. Grmek uses four letters and two signs to classify all tumors: S = single, M = multiple, c = cranial, a = axial or appendicular, + = ossifying, and - = osteolytic. Thus a solitary osteoblastic cranial lesion is coded as Type Sc+; the Kanam mandible fits this category. Multiple osteolytic lesions involving the skull and post cranial bones would be coded Mca-; the cases of presumed multiple myeloma from several sites are in this class. This simple system could be expanded to provide additional detail and to allow for coding of diagnostic information in a succinct form which might be less expensive than the written word.

219. **Grzywinski, L.** 1960. Analysis of feces from the Middle Age period. *Zool. Pol.* 10:195-199.

Thirty-six samples of feces of domestic animals from a Slavic settlement of the eleventh, twelfth and thirteenth centuries on an island in the Odra River, Poland, were subjected to physical, chemical, and biological analysis. A sedimentation and flotation method (saline and 50% potassium carbonate) was used. Ova of *Fasciola hepatica* were found in four samples. No other ova were found.

220. **Grzywinski, L.** 1962. Parazytologiczne analizy Kalow wykopaliskowych. *Wiad. Parazytol.* 8:543-548. (Parasitological analysis of excrement from excavations.)

One hundred and sixty seven samples of preserved feces of domestic animals from a tenth to thirteenth century Slavic settlement on an island in the Odra River, Poland, were examined for parasites. Ova of *Fasciola hepatica* were found in seven samples.

221. **Guidotti, T. L.** 1978. American Indian anthropology and medicine. *JAMA* 240:348.

Reference is made to Bennett's report (1972) of a high incidence of spina bifida occulta in remains from a Modoc Indian grave site. The Modocs are now extinct and the modern Klamaths, a related tribe, do not show an elevated incidence of neural tube defects. The cause of the defect, either genetic or hypervitaminosis A, seems to have died out with the Modoc.

H

222. **Hackett, C. J.** 1974. Possible treponemal changes in a Tasmanian skull. *Man* 9:436-443.

A Tasmanian skull in the Anatomy Department of the University of Edinburgh shows extensive pathological changes on the vertex. The lesions are described and noted to resemble changes labeled syphilitic in Australian aboriginal and European skulls in various museum collections. No other Tasmanian skull with pathological changes could be located. It is thought that the pathologic cranium belonged to a person who had contracted a treponemal infection, probably treponarid (endemic syphilis), during childhood.

223. **Hackett, C. J.** 1975. An introduction to diagnostic criteria of syphilis, treponarid and yaws in dry bones, and some implications. *Virch. Arch. A: Pathol. Anat. Histol.* 368:229-241.

Diagnostic criteria of syphilis and some other diseases are proposed from a study of 424 crania and calvaria and 250 long bones in 22 medical museums in Europe. Bone lesions of yaws in Ugandan and Australian aboriginal specimens were studied also. In crania and calvaria the sequential changes of Virchow's caries sicca, and in long bones nodes or expansions with superficial cavitation are sound indicators of syphilis, and of yaws and treponarid in certain geographic areas. There are discussions of osseous sequestra and of the number of bones showing diagnostic traits needed to demonstrate the endemicity of a particular infection in a past community. Application of these criteria to New World material is discussed; it is concluded that possibly only one skull, from Pecos Pueblo, New Mexico, meets these criteria.

224. **Hackett, C. J.** 1976. *Diagnostic Criteria of Syphilis, Yaws and Treponarid (Treponematoses) and of Some Other Diseases in Dry Bones.* New York: Springer-Verlag.

This is the definitive work on bone lesions in the treponematoses by the acknowledged master in the field. This distillation of 30 years of study of a vast number of specimens in museums around the world is required reading for those who study disease in ancient bones. Numerous examples of the pitfalls of the diagnosis of treponemal bone lesions are given, and a series of drawings illustrates the progression of diseases such as tuberculosis and cancer. A section on the origin of syphilis lists several theories, but omits Cockburn's suggestion that man was already infected with treponemes when he evolved from non-human primates.

225. **Hackett, C. J.** 1978. Treponematoses (yaws and treponarid) in exhumed Australian aboriginal bones. *Rec. S. Aust. Mus.* 17:387-405.

This well-illustrated paper is a sequel to the author's earlier studies in Australia. Hackett makes one correction, based on his work in Uganda: a condition called "boomerang leg" is no longer considered treponemal.

226. **Halbaek, H.** 1959. Grauballemandens aidste maltid. *Kuml* 1958:83-116, (Grauballe man's last meal.)

Examination of the well-preserved intestinal contents of Grauballe Man (ca. 300 A.D.) and Tollund Man (early Iron Age) from peat deposits in Jutland, Denmark, revealed ova of *Truchuris trichiura* in large numbers.

227. **Hall, R. and German, T.** 1975. Dental pathology, attrition, and occlusal surface form in a prehistoric sample from British Columbia. *Syesis* 8:275-289.

Three hundred and twenty-six dentitions were studied to describe and interrelate pathology and attrition, and to investigate the dynamics of the helicoidal form of the occlusal surface. All types of lesions were very low in frequency, the few caries found being mainly in molars and abscesses being the most common. Attrition was exteme and was probably partly responsible for the low incidence of dental disease. Heavy masticatory stresses associated with tough aboriginal foods were considered responsible for the severe attrition, in contrast to the usual cause, grit in the diet.

228. **Hallback, D. A.** 1977. A medieval (?) bone with a copperplate support, indicating an open surgical treatment. *OSSA* 3/4:63-82.

A left humerus, dated to ca. 1260-1527 A.D., was found wrapped with a length of copper plate and held together with rivets. The bone, believed to be from a male, was probably fractured during life. The plate was placed around the bare bone to stabilize it and consequently had an antibacterial effect on the wound. The patient appears to have survived a long time.

229. **Halpern, J. W.** 1971. Studying skulls in Egypt, U.A.R. *Res. News* 22:4-18.

A brief description of the work of James Harris done during several years in Nubia and in the Cairo Museum. Techniques are described and finds of both ancient skulls and features of modern Nubians are listed. What had been thought to be the mummified body of Queen Makeri proved to be the body of a hamadryas baboon.

230. **Hamada, G. and Rida, A.** 1972. Orthopaedics and orthopaedic diseases in ancient and modern Egypt. *Clin. Orthop.* 89:253-268.

Multiple sources of information, including mummies, iconography and papyri, were utilized in writing this general review of Egyptian orthopedics. Topics covered briefly include physicians, injuries, textbooks of trauma treatment, and a wide array of osseous diseases. A brief comment on the present state of Egyptian orthopedics concludes this well illustrated article.

231. **Haney, P. J.** 1974. Atlatl elbow in central California prehistoric cultures. In: *Readings in Archeological Method and Technique,* ed. R. Kautz, pp. 31-34. Davis, California, Univ. of Calif.

This equivocal study attempts to correlate arthritic changes at the elbow with changes in subsistence patterns. Samples were small; this adds to the difficulty of interpretation. A decrease in the prevalence of "atlatl elbow" was felt to be related to an increase in technological efficiency and an increase in agriculture as the subsistence mechanism.

232. **Hanzak, J.** 1977. Egyptian mummies of animals in Czechoslovak collections. *Z. aegypt. Spr. u. Alt.* 104:86-88.

The radiology of several animal mummies is presented. Most were birds, one of which was in an anthropomorphic bundle.

233. **Harding, J. R.** 1976. Certain upper Paleolithic 'Venus' statuettes considered in relation to the pathological condition known as massive hypertrophy of the breasts. *Man* 11:271-272.

Two Gravetto-Solutrean 'venus' statuettes, dating from ca. 25,000 to 18,000 B.C., may exhibit massive pathologic hypertrophy of the breasts. The treatment of such breasts by tribal healers in Africa can involve the making of incisions. Engraved lines seen on a third Gravetto-Solutrean figurine may have the same significance. The great antiquity of mammary scarification for therapeutic purposes is suggested.

234. **Harris, J. E.** 1977. The teeth of the Pharaohs. *Dent. Dimen.* 1:2-6.

A review of radiologic studies of the Egyptian Pharaohs and of modern and ancient Nubians.

235. **Harris, J. E. and Weeks, K. R.** 1973. *X-raying the Pharaohs.* New York: Scribner's.

This book has had a deserved popular success, for it is well written and summarizes some of the excellent work done by Harris and his colleagues in the preceding seven years. The mummies of the Pharaohs and their queens in the Cairo Museum form the finest collection of human remains from antiquity available to science. It was no mean achievement to succeed in X-raying them. Since the book was written in a popular style, much of the material, such as reviews of the history of mummification and the discovery of the royal mummies, will already be familiar to the sophisticated reader. The radiologic studies revealed many artifacts within the mummies and demonstrated the Pharaohs to be a markedly heterogeneous group. This fact necessitates reconsideration of the royal genealogy.

236. **Harris, J. E., Wente, E. F., Cox, C. F. et al.** 1978. Mummy of the 'elder lady' in the tomb of Amenhotep II: Egyptian Museum Catalog No. 61071. *Science* 200:1149-1151.

In 1898 a cache of mummies was found in the tomb of Amenhotep II. Most of these have been identified. This article reports the identification of one as Queen Tiye of the eighteenth Dynasty, wife of Amenhotep III and mother of Akhenaton. (A statue of Tiye is included among the colossi of Memnon at Luxor.) Identification was based on skeletal similarity to Tiye's mother, previously identified and on biochemical characteristic of a sample of hair obtained from a small wooden sarcophagus bearing Tiye's inscription and found in Tutankhamun's tomb.

237. **Harris, R. I.** 1949. Osteological evidence of disease amongst the Huron Indians. *Univ. Tor. Med. J.* 27:71-75.

This brief survey report concerns a historic Ontario Iroquoian ossuary which contained the remains of some 250 individuals ranging from earliest infancy to old age. Lesions included those of trauma, spinal tuberculosis, ankylosing spondylitis, osteoarthritis, dental disease, and squatting facets.

238. **Harrison, R. G.** 1966. An anatomical examination of the Pharaonic remains purported to be Akhenaten. *J. Egypt. Arch.* 52:95-119.

Detailed analysis of a skeleton found in the tomb of Queen Tiye, and considered by Elliot-Smith to have been Akhenaten, revealed the remains to be those of a young man who closely resembled Tutankhamun. The skeleton is probably that of Smenkhare, Tutankhamun's predecessor and probably his brother. The question of Akhenaten's disease remains open.

239. **Harrison, R. G.** 1973. Tutankhamun's postmortem. *Lancet* 1:259.

See Gray, 1973.

240. **Harrison, R. G. and Abdalla, A. B.** 1972. The remains of Tutankhamun. *Antiquity* 46:8-14.

A preliminary report of anatomical, radiographic, physical anthropological, and serological studies of the remains of the eighteenth Dynasty Pharaoh Tutankhamun and a brief comparison showing the apparent close genetic relation between him and his immediate predecessor Smenkhare. No features attributable to disease were found. In addition to similarities in size and general cranial features, the marked prominence of the occiput, the presence of epitrochlear foramina in the humeri, and the presence of blood groups A2 and MN in both subjects are cited.

241. **Harrison, R. G., Connolly, R. C. and Abdalla, A.** 1969. Kinship of Smenkhare and Tutankhamun demonstrated serologically. *Nature* 224:325-326.

The remains of these two mummies are blood group A, and they are both MN, increasing the probability of kinship between these two Pharaohs.

242. **Hart, G. D.** 1966. Trichoepithelioma and the kings of ancient Parthia. *Can. Med. Assoc. J.* 94:547-549.

Kings with facial lesions are depicted on a series of ancient Parthian coins, 123 B.C. to 222 A.D. Hart suggests that the lesion, apparently familial is trichoepithelioma and that these coins are its earliest record.

243. **Hart, G. D.** 1970. A haematological artifact from fourth century Britain. *Bull. Hist. Med.* 40:76-79.

Photograph of a crude votive arm, illustrating concave deformities of the nails, typical of iron deficiency anemia, from the late Roman temple at Lydney Park, Gloucestershire, England. The site may be associated with hydrotherapy. Its proximity to a Roman iron mine may be significant, if iron-rich water was used as part of the therapeutic ritual.

244. **Hart, G. D.** 1971. The Hapsburg jaw. *Can. Med. Assoc. J.* 104:601-603.

The characteristic Hapsburg face showed a prominent lower jaw, a humped nose, and a prominent lower lip. These features are depicted clearly on coins and may have been the result of inbreeding.

245. **Hart, G. D.** 1973. The diagnosis of disease from ancient coins. *Archeology* 26:123-127.

At the turn of the century, Warwick Wroth, Keeper of Coins and Medals at the British Museum, took note of a lesion on the foreheads of two Parthian kings, and called the lesions warts. Dr. Hart diagnoses the lesions as a familial tumor of hair follicles known as trichoepithelioma or epithelioma adenoides cysticum. Other coins show that Cleopatra had goiter and Ptolemy I had acromegaly.

246. **Hart, G. D., Cockburn, T. A., Millet, N. B. et al., eds.** 1977. Autopsy of an Egyptian mummy (Nakht - ROM I). *Can Med. Assoc. J.* 117:461-476.

This series of articles is an ideal presentation which provides a general overview and allows experts to present detailed information. Notes on the individual articles follow.

Millet, N. B. Archeologic background. An account of the excavation of the mummy in 1904. Translation of the coffin inscription yielded a date in the first half of the twelfth century B.C. The technique of mummification is discussed in relation to economics and funerary practices of the New Kingdom.

Rideout, D. F. Radiologic examination. Conventional radiography and xeroradiography demonstrated that the mummy was that of a 14-18-year-old male who had suffered severe recurrent illnesses during the last two years of life. The viscera appeared to be present. Shrinkage of the body indicated that it had become desiccated after wrapping.

Scott, J. W., Horne, P. D., Hart, G. D. et al. Gross anatomic and miscellaneous studies. Gross examination revealed the organs to be well preserved *in situ.* The spleen was enlarged and probably ruptured. Nuclear techniques revealed a high concentration of manganese in soil adherent to the wrappings. No viable micro-organisms were found, and the liver was negative for hepatitis B antigen. Computerized tomography of the brain revealed preservation of the gray and white matter and the ventricles.

Lynn, G. E. and Benitez, J. T. Examination of the ears. Radiologic and microscopic study of the temporal bones showed no evidence of antemortem disease.

Reyman, T. A., Zimmerman, M. R. and Lewin, P. K. Histopathologic investigation. Microscopic examination revealed many pathologic changes, including pulmonary anthracosis and infestation of the intestinal tract by tapeworm and schistosomes. The liver showed cirrhosis secondary to schistosomiasis; the urinary system was involved also. Death due to a ruptured spleen, common in cirrhosis, is suggested.

de Boni, U., Lenczner, M. M. and Scott, J. W. *Trichinella spiralis* cyst. A cyst in an intercostal muscle had a microscopic appearance interpreted as consistent with trichinosis.

Horne, P. D. and Lewin, P. K. Electron microscopy of mummified tissue. Well preserved ultrastructure of skin and of *Taenia* ova is presented.

Barraco, R. Analysis of protein extract. Biochemical analysis of muscle showed a concentration of cations equal to that found in fresh tissue; hence this mummy had not been treated with natron. Proteins of high molecular weight, which are protected by high concentrations of sodium, had been degraded, leaving only myoglobin.

Hart, G. D.; Kvas, I. and Soots, M. L. Blood group testing. Despite difficulties caused by bacterial and fungal contamination, the blood group was determined as type B.

247. **Hart, G. D., Kvas, I. and Soots, M.** 1978. Blood group testing of ancient material with particular reference to the mummy Nakht. *Transfusion* 18:474-478.

The serologic micro method and agglutination inhibition tests were applied to material from the spleen and sigmoid sinus of an Egyptian mummy. Both tests gave positive results for blood group B.

248. **Hartman, J. J., White, S. M., Ravin, J. G. et al.** 1976. The stones of madness. *Am. Imago* 32:266-295.

See Ravin et al., 1974.

249. **Hartney, P. C., Garrad, C. and Savage, H.** 1976. The Craigleith skull: a paleopathological specimen. *Na'pao* 6:1-4.

A cranium of historic date from Craigleith, Ontario, exhibits an oval defect in the frontal bone. A fragment of bone partly covered the opening. There was an incomplete zygomatic arch. The subject, apparently a young adult male, had probably suffered a blow to the head from a weapon resembling a sword. The defect on the right side of the face was probably caused by a club-like weapon. Evidence of healing indicates that the individual recovered from the attacks.

250. **Hawkes, P. N.** 1967. An application of methods for the determination of age, sex, stature and pathologies applied to skeletal material from 4-Sac-29 and 4-Yub-1. Sacramento, Calif.: M.A. thesis, Sacramento State College.

A well illustrated general survey of skeletal pathology covers material dating from the Middle (500 B.C. - 500 A.D.) to Late (500-1800 A.D.) Horizons and includes numerous lesions. Two possible cases of syphilis from the post-contact period are especially interesting.

251. **Hawkes, S. C. and Wells, C.** 1975a. An Anglo-Saxon obstetric calamity from Kingsworth, Hampshire. *Med. Biol. Illus.* 25:47-51.

The cemetery at Kingsworthy yielded 94 inhumations, including one woman and one baby. The pelvic shape was such that delivery would have been difficult, and the baby was large. It is suggested that the woman died in childbirth and was buried with her partly born child.

252. **Hawkes, S. C. and Wells, C.** 1975b. Crime and punishment in an Anglo-Saxon cemetery. *Antiquity* 49:118-122.

Two skeletons from graves in Hampshire are described, one of a middle-aged woman and the other of a sixteen-year-old girl. The suggestion is made that the latter had been raped and the former had perhaps committed adultery. The paper provides insight into the treatment of innocent and guilty in seventh century England. The two subjects were probably buried alive.

253. **Hawkes, S. C. and Wells, C.** 1976. Absence of the left upper limb and pectoral girdle in an unique Anglo-Saxon burial. *Bull. N.Y. Acad. Med.* 52:1229-1235.

In a carefully excavated grave of the sixth-seventh century B.C., a man's skeleton was found in which all the bones of the left shoulder girdle and arm were missing. Possible explanations are discussed, such as deception, disease, disturbance of the grave, or mutilation by bears or wolves; all are reviewed and dismissed. It is concluded that the absence was congenital. Compensatory body changes of scoliosis and lateral curvature and rotation of the vertebrae are mentioned in support of this opinion.

254. **Heathcote, G.** 1978. *Glossary/Index for R. Ted Steinbock's Paleopathological Diagnosis and Interpretation.* Ontario: Erindale College.

A dictionary used by students in a paleopathology course given by Dr. J. Melbye. Most of these students do not have a medical background and do not understand many of the terms used by Steinbock. The mimeographed product is rough, but could become a major contribution to the teaching of paleopathology. It is hoped that it will be continued, refined, and expanded.

255. **Heinemann, S.** 1974. Xeroradiography of a pre-Columbian mummy. *JAMA* 230:1256.

Examination of a 1,000-year-old mummy of a 3-year-old hydrocephalic child was felt to be more revealing than conventional X-ray, especially for material less dense than bone.

256. **Heinemann, S.** 1976. Xeroradiography: a new archeological tool. *Am. Antiq.* 41:106-111.

The application of this new technique is illustrated in the study of ceramic, stone, and wood artifacts. A brief comparison with conventional X-rays is given. Of particular note is the comparative portrayal of a pre-Columbian mummy of the Chalchihuites culture of Mexico by photography, X-ray, and xeroradiography.

257. **Heizer, R. F. and Napton, L. K.** 1969. Biological and cultural evidence from prehistoric human coprolites. *Science* 165:563-568.

A useful summary of the great amount of work that has been done in the analysis of coprolites from various Great Basin Indian sites in Nevada and the surrounding states. There are more than 50 references. Directions for future research are discussed.

258. **Hengen, O. P.** 1971. Cribra orbitalia: pathogenesis and probable etiology. *Homo* 22:57-75.

Analysis of 459 ancient skulls from central Europe and a review of the literature revealed the condition to be more common the closer the country was to the equator. A well-developed diploe was found necessary for development of the lesion. It is suggested that the

pathogenesis is medullary hyperactivity induced by iron deficiency anemia, due in turn to inadequate dietary intake and to parasitism.

259. **Herrer, A. and Christensen, H. A.** 1975. Implication of *Phlebotomus* sandflies as vectors of battronellosis and leishmaniasis as early as 1764. *Science* 190:154-155.

Carrion's disease and uta, a cutaneous form of leishmaniasis, are endemic in the Peruvian highlands. The latter, with its cut-away lips, has been depicted on Peruvian pots from Inca and pre-Inca times. The etiologies of the two diseases and their transmission by sandflies were established early in the present century. However, in 1764, one Cosmo Bueno reported folklore to the effect that both diseases are transmitted by sandflies, so that the name 'uta' was given to leishmaniasis and also to the sandfly.

260. **Hester, T. R. and Heizer, R. F.** 1973. Arrow points or knives? Comments on the proposed function of 'Stockton Points.' *Am. Antiq.* 38:220-221.

This paper concerns the interpretation of functional use (cutting implements vs. projectile points) and uses paleopathologic specimens to settle the case. Several examples of points embedded in the bones of prehistoric California Indians are presented.

261. **Hodge, G. P.** 1966. Pathology in fine art. *Visual Med.* 1:50-55.

See Hodge, 1977.

262. **Hodge, G. P.** 1967. An early medical museum. *Visual Med.* 2:23.

See Hodge, 1977.

263. **Hodge, G. P.** 1969. Perkeo, the dwarf-jester of Heidelberg. *JAMA* 209:403-404.

See Hodge, 1977.

264. **Hodge, G. P.** 1977. A medical history of the Spanish Hapsburgs as traced in portraits. *JAMA* 238:1169-1174.

In a series of nine well documented but somewhat repetitious articles, the authors demonstrate the great value of artistic depictions of a variety of diseases in tracing their history from dynastic Egypt to modern Europe. They are able to identify poliomyelitis, achondroplastic and pituitary dwarfism, congenital syphilis, tuberculosis, possible leprosy, hyperthyroidism, acromegaly, rhinophyma, congenital hypertrichosis, and a possible case of Arnold-Chiari syndrome with spina bifida, as well as a number of other neurological and emotional ailments. Two subjects are covered especially well. The first is the long list of congenital acquired diseases that beset the royal Hapsburg family of Spain, beginning with Charles V in 1516 and ending with the extinction of the family line and the death of Carlos II in 1700. This brilliant but inbred family suffered from congenital mandibular prognathism with enlargement of the lips and tongue, humped nose, a variety of mental and emotional illnesses, including epilepsy, congenital and acquired syphilis, gout, asthma, dropsy, and several congenital anomalies. See also: Hodge, 1969; Hodge and Ravin, 1969; Ravin and Hodge, 1968a, b, 1969; Grabb et al., 1968; Hodge, 1966, 1967.

265. **Hodge, G. P. and Ravin, J. G.** 1969. Spanish art: a contribution to medicine. *JAMA* 207:1693-1698.

See Hodge, 1977.

266. **Hoffman, J. M.** 1971. Educating the paleopathologist. *Colo. Anthropol.* 3:2.

The author raises important questions regarding the expertness required of a paleopathologist. The difficulty is that by the time a student obtains all the degrees recommended, he will be too old to do any research. The solution lies in teamwork, with several workers contributing their skills to a common end.

267. **Hoffman, J. M.** 1976a. Comminuted fracture of a humerus with pseudoarthrosis formation. In: *Studies in California Paleopathology,* by J.M. Hoffman and L. Brunker, pp. 25-39. Berkeley: University of California Archeology Research Facility.

The description and analysis of a fractured humerus with a ball-and-socket pseudoarthrosis introduces a general discussion of the etiology of false joints and the treatment of fracture among native Americans.

268. **Hoffman, J. M.** 1976b. Enlarged parietal foramina — their morphological variation and use in assessing prehistoric biological relationships. In: *Studies in California Paleopathology,* by J.M. Hoffman and L. Brunker, pp. 41-64. Berkeley: University of California Archeol. Research Facility.

A series of 13 crania exhibited a diverse pattern of variation in the expression of a hereditary congenital skeletal anomaly. The crania with enlarged parietal foramina came from two widely separated sites in the San Francisco Bay area. Because of the rarity of this anomaly, its autosomal dominant mode of inheritance, and its focal appearance at two sites which are known to share some cultural material, it has been suggested that the find represents evidence of direct biological contact between the peoples of two sites 50 miles apart.

269. **Hoffman, J. M.** 1976. An achondroplastic dwarf from the Augustine site (CA-Sac-127). In: *Studies in California Paleopathology,* by J.M. Hoffman and L. Brunker, pp. 65-119. Berkeley: University of California Archeol. Research Facility.

A detailed description of a dwarf believed to date from the Late Horizon, Phase II (1500-1800 A.D.), of the central California archeological sequence. The discussion involves an interpretation of bony abnormalities, and their anthropological and medical significance. Extensive photographic and radiographic documentation of the skeleton concludes the study.

270. **Hoffman, J. M.** 1979. On the likelihood that Mallin and Rathbun mistook an enlarged parietal foramen for a trephination. *Bull. N.Y. Acad. Med.* 55:708-716.

A critique of a diagnosis of trephination by Mallin and Rathbun (1976) is presented, and an alternative diagnostic possibility is suggested as being equally likely. Hoffman suggests that the investigators would have been better advised to have avoided making a definitive diagnosis.

271. **Hoffman, J. M. and Brunker, L.** 1976. A bibliography of California paleopathology. In: *Studies in California Paleopathology,* by J.M. Hoffman and L. Brunker, pp. 1-23.

This annotated bibliography contains 77 articles dealing with the paleopathology of human and non-human material from California. Most of the articles are purely descriptive, reflecting the fact that modern anthropologic approaches to the study of prehistoric disease in California have begun only recently.

272. **Holliman, R. B.** 1970a. Evidence of a prehistoric physician in Virginia. *Va. Med. Month.* 97:642-644.

A burial of an Indian shaman is described. The skeleton was accompanied by a number of items comprising the medical kit of this sixteenth century practitioner.

273. **Holliman, R. B.** 1970b. A prehistoric case of osteo trauma. *Va. Med. Month.* 97:212-213.

A site excavated in Virginia was apparently a walled fortified village of the sixteenth century. One hundred skeletons were excavated in 1966. One had an arrowhead *in situ* at the costal demi-facet on the body of the eighth thoracic vertebra. The Indian survived for several years, as was shown by the amount of callus and bone proliferation.

274. **Horne, P. D., Mackay, A., Jahn, A. F. et al.** 1976. Histologic processing and examination of a 4,000 year old human temporal bone. *Arch. Oto-Rhino-Laryngol.* 102:713-715.

The temporal bone, from a mummy head provided by the Royal Ontario Museum at Toronto, was processed by decalcification and serial sectioning. The tympanic membrane was perforated. The individual had suffered from acute and chronic otitis media. Six good color photographs are included.

275. **Hossaini, A. A. and Allison, M. J.** 1976. Paleoserologic studies: ABO and histocompatibility antigens in mummified American Indians. *Med. Coll. Va. Quart.* 12:67-73.

This report details the testing of 111 Peruvian mummies for blood group and 16 histocompatibility antigens. The methods and results are presented in detail. Similarities to modern Indians and dissimilarities to Caucasians were noted.

276. **Houghton, P.** 1975. A renal calculus from proto-historic New Zealand. *OSSA* 2:11-14.

A renal calculus from a Maori burial is reported. Chemical analysis revealed only calcium oxalate. The failure to detect phosphate and the dissolution of parts of the internal structure of the calculus suggests that water percolating through the soil was slightly acidic.

277. **Hrdy, D. B.** 1978. Analysis of hair samples of mummies from Semna South (Sudanese Nubia). *Am. J. Phys. Anthropol.* 49:277-282.

Physical, biochemical, and statistical analyses of hair from Nubian mummies dating from the 1st to the 10th century A.D. were carried out. The samples were from Meroitic, X-group and Christian periods. The results are interpreted in terms of the relations among these groups.

278. **Hudson, C., Butler, R. and Sikes, D.** 1975. Arthritis in the prehistoric southeastern United States: biological and cultural variables. *Am. J. Phys. Anthropol.* 43:57-62.

Recent research shows that a bacterium, *Erysipelothrix insidiosa,* can produce rheumatoid arthritis in deer and some other animals and that man can be infected by this organism. Examination of the archeologic record suggests that both cultural and biologic variables may be interrelated in the maintenance of some forms of arthritis during long periods of time in geographically distant populations. Cherokee folk beliefs concerning arthritis suggests some recognition of this connection.

279. **Hurtado, E. D.** 1970. Pre-Hispanic osteopathology. In: *Handbook of Middle American Indians, Vol. 9, Physical Anthropology,* ed. T.D. Stewart, pp. 68-81. Austin: Univ. of Texas Press.

Data obtained in 100 individuals form the basis of this brief review of Middle American paleopathology. Most cases illustrate common traumata, infectious processes, and degenerative diseases. An unusual case shows a degenerative or possibly surgical process affecting the left mastoid, temporomandibular joint, and zygomatic regions. The left mandibular condyle was absent. In other cases the diagnoses of hyperparathyroidism (von Recklinghausen's disease), osteogenic sarcoma with metastases, and macrocephaly are suggested.

280. **Huth, P. J.** 1974. Lead content in human hair from pre-industrial societies. M.S. thesis, Mich. Technol. Univ.

The lead content of human hair obtained from pre-industrial people in Peru, Alaska, Egypt, and southwestern United States was measured by atomic absorption spectroscopy, as a relative measure of total accumulation and environmental exposure to lead. Compared to contemporary U.S. samples, lead content was high in pre-Columbian Peruvians but low in prehistoric southwestern Indians. It is suggested that the latter provide a baseline level. Lead level was high in Aleuts before Russian contact and was variable in ancient Egyptian hair.

I

281. **Isaacs, W. A. et al.** 1963. Collagen and cellulose-like substance in fossil denture and bone. *Nature* 197:192.

Dinosaur bone, 200,000,000 years old, and dermal armor of the Devonian Age were decalcified and examined by electron microscopy and electron diffraction. A fibrillar structure with a collagen pattern was found.

282. **Ivanhoe, F.** 1979. Direct correlation of human skull vault thickness with geomagnetic intensity in some northern hemisphere populations. *J. Hum. Evol.* 8:433-444.

Increased magnetic fields stimulate osteogenesis, an observation that has been exploited recently as a means of accelerating the healing of fractures. The earth's geomagnetic intensity has fluctuated in the past. Using 36 Caucasoid, Mongoloid and fossil populations, the author shows that the thickness of the cranial vault has varied directly with the earth's geomagnetic intensity during the past 360,000 years.

J

283. **Jakobsen, A.-L. L.** 1978. A cripple from the late middle ages. *OSSA* 5:17-24.

A skeleton of an adult male presented a comminuted fracture of the left femur, healed in a bad position, healed fractures of the left forearm with pseudoarthrosis, and the sequelae of an amputation of the distal portion of the right leg. Possible causes of the lesions and their chronology are discussed.

284. **Jansen, J. and Boersema, J. H.** 1972. De wormeiren uit de latrines van het poorthuis. In: *Vondsten onder de Sint Olofshapel,* p. 41. Amsterdam: Inst. Pre- and Protohist., Univ. of Amsterdam. (Helminth eggs from the latrine of the Olofskapel Gatehouse).

Two samples from the latrines of this Amsterdam gatehouse were dated to 1370-1425 A.D. and contained ova of whipworm and ascaris, as well as unidentified *Trichuris* and Capillaria. The rarity of tapeworm ova in such material is attributed to their fragility. The results are compared to those of similar studies.

285. **Jansen, J. and Over, H. J.** 1962. Het voorkomen van parasieten in terpmateriaal uit Noordwest Duitsland. *Tijdschr. Diergeneeskd.* 87:1377-1379. (Findings of parasites in protohistoric material from northwest Germany.)

Ova of Ascaris lumbricoides, several species of *Trichuris, Fasciola hepatica,* and beef, pork and fish tapeworm were found in human material from a site occupied from 100 B.C. to 500 A.D. Ova of *Toxocara canis* and *Oxyuris equi* were also found.

286. **Jansen, J. and Over, H. J.** 1966. Observations on helminth infections in a Roman army camp. *Int. Congr. Parasit., Rome, 1964, Proc.* 2:791.

Ova of whipworms and ascaris were found in material from a Roman fort in the Netherlands. The material was dated to the first century A.D. Ova of *Oxyuris equi* were also found. Samples from the same excavation but dated to the Middle Ages contained ova of several species of *Trichuris,* but no ascarids.

287. **Janssens, P. A.** 1963. La rade de Furfooz: son âge, sa pathologie. *Bull. Soc. Belge. Anthrop. Préhist.* 73:45-55. (The Furfooz people: period and pathology.)

Description of neolithic bones from a cave in Furfooz, Belgium. No signs of syphilis or vitamin D deficiency were found. The only tumors were exostoses and osteomata. Infection was seen in two cases and trauma was common. Healed parry fractures were found in four cases.

288. **Janssens, P. A.** 1964. Étude anthropologique et paléopathologique des ossements de la grotte d'Antheit. *Bull. Soc. Belge. Anthrop. Préhist.* 74:59-68. (Anthropologic and paleopathologic study of bones from Antheit cave.)

Lesions found in 8 individuals from this cave included alveolar granulomata, arthritis, vertebral fusion, and a healed femoral fracture with overriding. The latter resulted in shortening of 4 cm.

289. **Janssens, P. A.** 1970. *Paleopathology: Diseases and Injuries of Prehistoric Man.* London: Baker

This well illustrated general survey is of value for its coverage of the European literature and the presentation of art works as evidence of prehistoric disease. Otherwise, the material is similar to that presented elsewhere.

290. **Janssens, P. A.** 1974a. L'Examen des ossements incinérés des tombelles de la Wahnerheide (West Germany). *Hades* 13:23-32. (Examination of cremated bones from tumuli in Wahnerheide.)

Description of cremated bones found in tumuli of the Halstatt period. Skeletal remains of 7 individuals were found, one of wich was a 50-year-old man with some vertebral lipping.

291. **Janssens, P. A.** 1974b. Het radiografisch onderzoek van de mummie. *Antwerpen* 20:137-143. (Radiologic examination of a mummy.)

It was found that the bones of this Egyptian woman, estimated to be 50 years of age, were disconnected and jumbled together inside the mummy. Lesions included dental caries, vertebral lipping, and a healed transverse fracture of the distal left ulna, without a fracture of the corresponding radius. The coffin was dated from the twenty-first Dynasty, but the technique of mummification suggests a date in the eighteenth Dynasty.

292. **Janssens, P. A.** 1975/76. Anthropologisch en paleopathologisch onderzoek van de menselijke beenderresten uit de waterput van gebouw B de Tongeren (Belgie). *Hades* 14-15:19-34. (Anthropologic and paleopathologic investigation of human bones from a well of building B in Tongeren, Belgium.)

An examination of single bones of 8 individuals, including four children. An adult male showed a wound probably made by an arrow point on the occipital bone. Two of the children showed traumatic lesions of the skull. A woman showed a severe periosteal reaction on the left tibia, resembling syphilis. It is probable that this is a whole family, murdered by another group of invaders, shortly after 250 A.D.

293. **Janssens, P. A.** 1978. Recapitilerende Beschouwingen over 'Archeologische Lepra.' Twee Gevallen van 'Pseudo-Lepra' uit de Romeinse Periode in Belgie. *Ann. Coll. Med. Antverp.* 32:5-22. (Re-examination of 'archeological leprosy.' Two cases of 'pseudo-leprosy' from the Roman Period in Belgium.)

The skeletal findings in leprosy are reviewed. Two cases are presented in which the paleopathologic lesions could be taken to be those of leprosy. The first is a periosteal reaction to a chronic infection, and the second is a multifocal form of osteochondritis dissecans.

294. **Janssens, P. A. and Duquenne, F.** 1973. Radiografisch en autoptisch onderzoek van twee mummies uit de Romeinse periode. *Hades* 12:1-27. (Radiology and autopsy of two mummies from the Roman period.)

Two Egyptian mummies were studied. The first, a girl about 18 to 21 years old, showed many fractures, assumed to be post mortem. Dating was based on the decorations on the wrappings. The other was a man of about 25 with a healed peritrochanteric fracture of the right femur with slight shortening. A slight scoliosis was considered to be secondary to limping caused by the femoral fracture. A bronze coin of Emperor Vespasian (69-79 A.D.) was found in the wrappings.

295. **Jarcho, S., Simon, N. and Bick, E. M.** 1963. A fused hip from Wupatki. *Plateau* 35:69-74.

A fused left hip from Wupatki Pueblo in Arizona, dating from ca. 1051-1250 A.D., is described. The joint was ankylosed in a position of flexion adduction. The lesion is thought to be due to non-tuberculous bacterial infection.

296. **Jarcho, S., Simon, N. and Jaffe, H. L.** 1965. Symmetrical osteoporosis (spongy hyperostosis) in a prehistoric skull of New Mexico. *El Palacio* 72:26-30.

An Anasazi skull, ca. 1000-1100 A.D., showed lesions of "symmetrical osteoporosis," thought to be due to some type of hemolytic anemia. The authors suggest the term "spongy hyperostosis" for this lesion. (Porotic hyperostosis has come to be the accepted term since this article was published.)

297. **Jaworowski, Z.** 1968. Stable lead in fossil ice and bones. *Nature* 217:152-153.

Dithiozone colorimetric analysis revealed an increasing mean concentration of lead in glacial ice from Poland during the last 100 years. Lead content of bone in contemporary residents of Poland was found to be lower than that for Poles in the 11th through 19th centuries, when lead content was quite high. It is suggested that the supposed high lead body burden of people in modern western societies is due directly to sources other than the atmosphere, such as diet.

298. **Jiminea, C. V.** 1979. Ankylosing spondylitis. *Henry Ford Hosp. Med. J.* 27:10-13.

This is an ancient disease, with paleopathologic evidence dating to 2900 B.C. The history and clinicopathologic features of the disease are reviewed.

299. **Johanson, G.** 1977. Iron from cannonballs in teeth and jaws. *OSSA* 3/4:183-188.

Teeth and jaws found on a salvaged seventeenth century Swedish warship were found by radiography to contain crystals of ferric phosphate. The iron from cannonballs on the ship bound with the phosphates in the areas where soft tissues remained the longest.

300. **Jonquieres, E.** 1977. An ancient Briton adds to the story of leprosy. *Int. J. Lepr.* 45:66.

A skeleton found in Dorset and dated to 350 A.D. had been diagnosed as leprous (see Skinsnes, 1975), on the basis of a 'sucked candy' appearance of the phalanges of the foot. The author points out that this appearance is not absolutely specific for leprosy, being seen also in a disease common in Argentina, the Bureau-Barriere disease, the antiquity of which is unknown.

301. **Jurmain, R. D.** 1975. Distribution of degenerative joint disease in skeletal populations. Cambridge, Mass. Ph.D. thesis, Harvard University.

Degenerative joint disease was scored for the knee, hip, shoulder and elbow in 798 skeletons from four isolated or partly isolated populations: white Americans, black Americans, Eskimos, and Pecos Pueblo Indians. The Eskimos had an earlier onset, higher frequency, and greater degree of arthritis for every joint studied. This pattern and within and between joint differences is attributed to the effects of environmentally conditioned stress. Other factors such as age, sex, and hormonal influence cannot be ignored, as they also contribute to the onset of degenerative joint disease.

302. **Jurmain, R. D.** 1977a. Paleoepidemiology of degenerative joint disease. *Med. Anthropol.* 1(No. 1, pt. 1):1-14.

Eskimos were found to be the most severely affected of three human skeletal populations studied. Culturally based variations in biomechanical stress are posited as the cause of the observed differences.

303. **Jurmain, R. D.** 1977b. Stress and the etiology of osteoarthritis. *Am. J. Phys. Anthropol.* 46:353-365.

The data presented in this article are from Jurmain, 1975. The author's conclusions regarding the interplay of stress, sex, age, and hormonal factors are probably most appropriate when severe forms of the disease are considered; stress is probably the most important etiologic factor in such cases.

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Twentieth Century Psychiatry — Living History In the Life of Kenneth E. Appel, M.D. 1896-1979*

DANIEL BLAIN

INTRODUCTION

IT is my purpose to present evidence of the impact of Dr. Appel's life and achievements in certain areas of American psychiatry.[1] I shall concentrate upon three aspects of his career:

1.) The development of the Department of Psychiatry, School of Medicine, University of Pennsylvania;
2.) Innovations in Psychotherapy for long term treatment failures;
3.) Public Leadership in Mental Health.

CHRONOLOGY

1896, May 15, born in Lancaster, Pa.
1915, Graduated at Franklin and Marshall College.
1917, M.A. and Ph.D. in Psychology and Philosophy, Harvard University.
1918-21, Military service and Foreign Travel Fellowship.
1921, Married to Madeleine Hunt of Boston.
1924, M.D., Harvard Medical School.
1925-26, Rotating internship, Hospital of the University of Pennsylvania.
1926-28, Psychiatric residency, Department of Nervous and Mental Disease, the Pennsylvania Hospital.
1929, Began as instructor, Department of Psychiatry, University of Pennsylvania.
1929-79, Engaged in private practice of psychiatry, Institute of Pennsylvania Hosptial.
1943-45, Acting Chairman of the Department during Dr. Strecker's absences on W.W. II assignments.
1946, Appointed Professor of Psychiatry, University of Pennsylvania, School of Medicine.

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*Delivered before the Section on Medical History, College of Physicians of Philadelphia, October 17, 1979.

1. The sources available are an oral history conducted by this author in June, 1978 and the book *Equanimitas and Courage* taken from recordings of Dr. Appel's remarks to his friends on the occasion of his 80th birthday, May 15, 1976. I have consulted other published materials. These comments are drawn largely from the oral history and Dr. Appel's own words.

1952-62, Chairman, Department of Psychiatry, University of Pennsylvania.
1953-54, President, American Psychiatric Association.
1962, Kenneth E. Appel Chair in Psychiatry established.
1978, Awarded Distinguished Service Medal, American Psychiatric Association.
1979, August 27, died in Ardmore, Pa.

THE FOUNDATIONS

The quiet, unassuming, gentle mannered Kenneth Appel I met in Washington in 1948, greeted me warmly and was interested in my origins, my travels, and my interests. There followed a close friendship and mutual understanding which revealed much of his character and its development. He was born in Lancaster, Pa., the heart of the Pennsylvania Dutch country, close to Philadelphia, but proud of its identity, its independence, and its record in the two wars for independence, 1776 and 1812. He was the youngest of four boys, was babied and loved it. He remembers with simple pleasure riding around in an oversized baby carriage, pushed by one of his brothers. He grew strong, but not overly large or tall, and had a big appetite. He liked a good time and had many friends. He recalls when he was two, his grandfather in death, lying in his coffin, and his grandmother weeping as she sat in a rocking chair. He would wake in the night and run into his mother's bed and snuggle close. His mother died when he was nine, and he remembers his brother's fiancee mothering him. Later he would often go over to his uncle's office, and read when he was lonesome. This uncle was James Z. Appel of Lancaster, who became president of the A.M.A. in 1932. They like to talk together. His family contained many physicians and ministers, and was closely associated with the German Reformed Church and Franklin and Marshall College, where his grandfather and an uncle had been President. His father presided over the Board of the Seminary, a branch of the college. He was a liberal in theology and politics but strict in discipline. It was a happy family. His father was devout, reading the Litany every day to the family during Lent. Kenneth greatly admired his oldest brother, big, tall, and strong, who delivered ice and walked the five miles to his place of business. In school, he was mischievous but learned how to keep from being caught. He enjoyed sports and was a fast runner. He generally accepted the notion that one ought not pursue good grades or be ambitious. However, as a steady consistent worker, he always received good grades without trying.

In his sophomore year in college, he suffered a nasal fracture in football complicated by cellulitis, threatening the meninges. He spent several months at home. During this period he became an avid and constant reader, a trait which persisted throughout his life. As his knowledge grew in many directions, he acquired more and more reference books which were piled up throughout the

house. He also bought books that sounded interesting, thinking he would read them at some time later. His wife later said he was much pleased when a book lying around the house became on an unexpected occasion just what he needed.

He suffered pain for many years of his life. Headaches endured throughout the first 28 years were finally traced to an imbalance in the eye muscles, and a threat against a medical career was removed. In middle age he developed painful osteoarthritis of a hip, and felt he was deprived when two experts advised against the hip operation that Howard Rome had mentioned. Their advice was, "It is too new." Some years later, to his great relief, a plastic hip was inserted. He began to notice that experts weren't always right.

Experimenting with pain killers and sedatives, he found that smaller doses than those recommended by manufacturers were often effective. In his later years, he had severe cardiac discomfort, yet he grew more and more quiet, patient, uncomplaining, and philosophical. He became a cheerful optimist, a fighter against suffering and despair in his patients.

His creative imagination produced many ideas, and he was known to make suggestions to anyone who was engaged in something which interested him. In the group of ten presidents of the A.P.A. from 1948-58, he was dubbed "The Idea Man" by one of the staff.

His first step in the practice of medicine was practical experience under organized supervision. It was then called simply *internship*. It was the custom at that time to specialize even in internship. Appel was mature enough to look to the future. As a psychiatrist, he needed thorough grounding in all aspects of medicine. He was advised at Harvard by several who appreciated his concern, and was influenced by Francis Peabody. The Harvard hospitals taught chiefly straight medicine and straight surgery. Rotating internships were and still are (1979) required in Pennsylvania. He was unknown in Philadelphia when he applied, and learned a critical lesson in local mores. The story is as follows: His first choice was a Philadelphia hospital of some prestige. He was seen by a nationally known physician. Dr. Appel said, "He did not read the records and recommendation I had brought, but asked who I was. Did I know anyone on the faculty or Board of Trustees, where did I go to college, [to] medical school? He seemed ill at ease, and then said I would have to wait a few days while they considered my application (including the social status of my family)." Dr. Appel was mild in his appraisal: "They were a little conservative," he said. The next day, he took his papers to the authorities of the Hospital of the University of Pennsylvania and was immediately accepted. He was the first intern not from a local medical school accepted in any Philadelphia hospital.

The remainder of Dr. Appel's career is discussed under the several headings in which he made major contributions.

Friends at Harvard and in Philadelphia strongly advised residency in psychiatry under the influence of Earle Bond and Edward Strecker at

Pennsylvania Hospital. They were on the faculty of the Medical School of the University of Pennsylvania.

CONTRIBUTIONS TO "A PAGE IN HISTORY"

Innovator as Teacher and Department Organizer.

Dr. Appel approached his career as a teacher and Department Chairman from his primary interest in the care of patients. Two statements in the Oral History give an indication of this influence. "I heard that lawyers in their schools were using the case method in their instruction. I decided to try this method and found it convenient to my thinking. I was not interested in didactic lectures but liked to use a clinical case with a visible patient to illustrate a central point." And in answer to a question, "Have you ever been literally ecstatic?" "Yes," he replied, "when I have helped a patient recover from a serious illness, or a serious difficulty, or a crisis." That was where his heart was. He surrounded himself with young graduates entering practices, giving them a start. They would review their cases with him at regularly scheduled seminars. After his residency, he stayed on as a staff member. He attracted attention during this time and was sent abroad twice with a senior staff member to study European institutions as models for the new Institute under consideration. It is worth noting that Appel followed Edward A. Strecker, the clinician,whereas Lauren Smith, sent by Orton of Iowa, followed Earle Bond, the administrator and organizer. Dr. Strecker was Professor in the undergraduate School of Medicine of the University of Pennsylvania and at Jefferson Medical School as well as Professor of Psychiatry and Mental Hygiene at Yale. Strecker became Chairman of the Department in 1932 and held the chair for twenty years; he lived all this time, at the Pennsylvania Hospital and the Institute.

This hospital and its branches and the University of Pennsylvania produced seven presidents of the A.P.A. including Dr. Appel, and during and after Appel's tenure four more. There were, of course, a number of the staff members who were affiliated with other medical schools in the city, providing, according to Dr. Appel, a fine broadening influence.

Appel said, "Strecker had his office in an office building, the first psychiatrist in the nation to move out from a hospital. I became assistant to him and wrote histories, later spent some time with his patients, and began to do some teaching in connection with the patients I was associated with."

It had been customary since the beginning of Pennsylvania Hospital, and common to the Philadelphia area, that no one was paid for teaching effort or time. Strecker paid one assistant $150 a year to prepare a patient and his history for the weekly lecture. Appel, after he got started, added an equal amount. There was no other budget.

Important events during Appel's early career included the construction of the

new building of the Institute in 1928, the organization of the American Board of Psychiatry and Neurology in 1934, and the absence of Strecker during much of W.W. II. Dr. Strecker was one of the leading psychiatrists in the nation; he became Consultant to the Army, the Navy, the Air Surgeon, and the U.S. Public Health Service. Appel was left to act in his place. Soon after the end of the war the Veterans Administration was established with its Psychiatry and Neurology program. On January 2, 1946, Congress had approved the creation of a new Department of Medicine and Surgery, and the bill was signed by the President. Psychiatry was an important constituent. Over 100 residents were waiting in Topeka to start their residency.

The Deans' Committee program began that day, and in Philadelphia, Kenneth Appel became the Chairman of the Deans' Committee representing the five medical schools. He arranged for Howard Rome to be released from his other committments at Pennsylvania Hospital so that he could become Executive Officer of the Committee and assume the responsibility for organizing the entire V.A. residency teaching program. He also attempted to get Francis J. Braceland, who had been Dean at Loyola and who was with the Navy, to allow his name to be submitted for consideration as Dean of the University of Pennsylvania Medical School. Appel also offered him the position of Assistant Administrator of the Institute for Clinical Programs. He accepted neither, but went on to the Mayo Clinic in Rochester, Minnesota, where he further developed his capacity for national leadership. Rome followed Braceland to Rochester.

In 1946, Appel was promoted to full Professor in the Department. As would be expected, he became involved in the active movements that characterized the post-war era, joining the Group for the Advancement of Psychiatry, the "Young Turk movement" in the A.P.A. Here he met colleagues from across the nation, and was embarrassed to learn about the large budgets of the leading medical schools.

When the Medical Director of the A.P.A. received approval from President William C. Menninger to organize the first of the Mental Hospital Institutes, Menninger wanted to have it in Philadelphia, where the A.P.A. had been organized in 1944. Kenneth Appel agreed to be the Chairman of the Arrangements Committee, which was convened in April, 1949. The Institute was so successful that it was made an annual affair. It was at the fourth Institute that Appel launched his appeal for a national study into the deplorable state of public mental hospitals (see Contribution III). In 1951 the Cornell Conference on Psychiatric Education for Undergraduates met. The Residential Training Conference was held in 1952 in Ithaca, New York. Dr. Appel played a leading role at both of these conferences. He was an elder-statesman in the follow-up held ten years later in 1962.

An event took place during the first conference which influenced Appel's immediate future. His subcommittee completed the immense task of gathering

new statistics on training needs and developments. They were scheduled to present their materials on the first morning. The audience had traveled all night, Ithaca being difficult to get to, and as a result, their response to the committee's work was very disappointing. Instead of the expected praise there was mostly silence. In the hall at the recess, Appel and his group were furious. A group of his close supporters decided the time was right for them to obtain for him the nomination for president of the A.P.A. He was nominated, elected President, and assumed office in 1953. He was in a strategically strong position to launch his drive for the national study on the conditions in mental hospitals in October, 1953. Dr. Strecker retired as Chairman of the Department in 1952, and Appel succeeded him. In the oral history Appel spoke in detail of the development of the Department. He had canvassed other training programs, and realized that there were pressures across the nation for a wider academic scope, a more broadly based teaching of psychiatry. He obtained research money for the teaching faculty, and soon other money for the teaching program. Upon retirement after ten years, his annual budget exceeded one million dollars.

Early on, the new chairman invited a group of senior staff to meet at the university each Monday for two hours. They discussed the affairs of the Department. Appel was never a despotic chairman. He invited comment and solicited suggestions and new ideas. He welcomed a distribution of responsibility. The work of teachers was scrutinized, and on two occasions work was considered unsatisfactory. The group as a whole decided upon the course of action: curricula were reviewed; innovations soon appeared; morale improved; and a new spirit was developed. As money was obtained, full-time teachers were added, and a representative faculty emerged. Scientists in related fields were added, among them psychologists, anthropologists, and sociologists. Leaders were encouraged to work in a broad range of basic and applied studies.

In the meantime several innovations were introduced which might be subsumed under the rubric of social psychiatry. Emily Mudd, a Ph.D. in Sociology, had been a social and professional associate. She had brought national recognition to her pioneering program in Marriage Counseling, and had, with Appel's help, affiliated it with the University of Pennsylvania. Dr. Appel brought her program into the Department of Psychiatry, and introduced two broadening innovations. He introduced first a Family Advisory Course primarily for second-year medical students. The course emphasized the importance of family environment. John Hubbard supervised the program for a time. Secondly, Dr. Appel organized the first out-patient psychiatric clinic in the Hospital of the University of Pennsylvania. He termed it the "functional clinic," partly to disguise the connection with psychiatry, partly to arouse curiosity, but most importantly to signify that the clinic was comprised of a hospital and medical school working in tandem for the advancement of psychiatry. T. Grier Miller assisted Appel by allocating some space for psychiatric work in the area of the gastrointestinal

clinic. The functional clinic accepted referrals from anyone in the hospital. Dr. Appel said, "It [the clinic] wasn't psychiatric, it wasn't for neurotics or neurological cases, it was for any functional needs." The clinic drew responses from other departments in the medical school and from hospital personnel. Its name still aroused curiosity well into the 1960s.

The next step was the general recognition of sexual malfunction and its relation to health. The strategy behind introducing the term *sexual* into the Medical School Catalogue is worth telling. It was inserted between two already accepted new ideas: Family Attitudes and Marriage Counseling. Dr. Mudd was invited to the weekly meeting, now called the Executive Committee. This was the first. Now forty schools use it.

The year 1962 saw the fulfillment of a dream: the establishment of the Kenneth E. Appel Chair of Psychiatry for the Chairman of the Department. In 1978, at the Annual Meeting of the American Psychiatric Association, Kenneth Appel was awarded the Association's Distinguished Service Medal for Contributions to Psychiatry.

THERAPY FOR A HOPELESS PATIENT

Dr. Appel said in the Oral History: "A case that taught me a tremendous amount in psychiatry was a patient who had been ill with kidney disease. I had worked out with Dr. Bond, a rate of $15.00 a week for three months at the Institute of Pennsylvania Hospital, and arranged for her to spend the winter at the state hospital. That went on for four years. She had kidney disease, delusions, hallucinations, and was paranoid. I hired a volunteer, a girl who had a successful business experience, and wanted to get into social work. I hired her for an hour a day, to sit at the bedside of this sick girl, who was in the Department of Nervous and Mental Disease, a branch of the Pennsylvania Hospital. This was before [it was named] the Institute [of Pennsylvania Hospital].

I said, 'I don't care what you do, whether you knit, talk of Shakespeare, read the Bible, or just sit by the side of her bed, even if you don't talk; hear what she talks about, what she says. Do that an hour a day, six days a week.' Well, that was the beginning of the recovery of this patient and she has been well for years. It wasn't didactic, it wasn't anything theoretical, it was a sort of social relationship, of someone in touch with her on whom she could count every day. She made a complete recovery after over four years of schizoid symptoms. Well, that case taught me more than any other case I ever had, because it taught me about the social relationship of one human mind to another in helping people recover from severe mental symptoms. Classical therapy went on at the same time.

Dr. Francis Peabody, whom I knew in Boston and influenced me to go to Philadelphia for a rotating internship, wrote a book on *The Care of the Patient is Caring for the Patient.* This influenced me very much. I thought this was a tremendous factor in therapy of the patient. The experience with this patient

greatly increased my background, the fundamentals of my therapeutic relationship and a great deal of my success. I was a very successful practitioner of psychiatry. [Hearsay at the Institute was that he had the biggest psychiatric practice on the Eastern seaboard.] This patient got well and for years lived a useful life, teaching in college. She had had two years with insulin, and the best medical care at Oxford, and before that at Radcliffe College Infirmary. I couldn't think of anything else, any other medication. It was just a thought to try this, why not see what happens to being with another being, for an hour a day, regularly, someone who is sympathetic, who is understanding of his or her condition, who is trying to be of help. When you are with a delusional patient, a schizophrenic patient, talking about coming to an understanding of his or her condition was out of the question, but there was something more fundamental that one could advise and I thought this relationship, of someone sitting by the bedside, would be helpful.

Actually, I did some psychoanalysis with psychotic patients for eight to ten years. My analytic training had taught me to sit quietly with an uncommunicating patient and say to myself, 'Here I am and here you are and something will happen sometime if one is patient, kindly and not didactic'."

On another day, during the creation of the Oral History, another patient came to Dr. Appel's mind. He said, "There was a patient who had been sick for many years, with visits to famous clinics in America and Europe, suffered from severe asthma and other physical conditions, was emaciated, weak, unresponsive, mute. I was asked to see her and went to her home. She was in a back room, lying on the floor, under a table. She did not respond but her head was turned away. I did not talk. I waited. I crawled under the table, beside her. After awhile, I went out and got a book with pictures of animals and held it so she could see. I very slowly turned the pages ... after a good deal of time, I felt her hand touch my arm, 'Wait! Let me look at that.' I had broken through. Later, she said, 'It was not what you said, but that you were willing to go to all that trouble, just for me. I began to hope.' She got well and is living today."

It sounds simple. It was not. He had to keep demonstrating his understanding, patience, dependability, wisdom and skill.

Related to this were other thoughts and bits of experience. He had learned to put up with painful headaches for twenty-eight years. He had trouble with his eyes, and later he had osteoarthritis of the hip. He adopted the slogan, "Nothing is final. All will change." And to compulsive or anxious patients demanding yes or no answers he said, "There are no emergencies (except choking, cardiac, drowning). Go slow —delay, divert, break up complexes and contexts. Pick up words, synonyms, move into contexts they select, tactfully delay the process. Things are all in process, they are not fixed. I think of it really as a process of gradualism. That word has helped a lot in my thinking with patients. Growth takes place gradually. One has to play for time, allow for alternatives to appear.

Patients can think for themselves of alternatives and opportunities to help in their thinking. This moves them into profitable areas of discourses and discussions."

Dr. Appel learned from Bleuler's concept of schizophrenia. He said, "This made me search further in therapy. I have always searched for something new. I follow the advice of elders, and my superiors, but I have always been searching for something new, something that would work, something that helped." His wife said, "He had an insatiable curiosity and determination. He never gave up. That's why he would go back to the Institute after supper and see patients who couldn't sleep after midnight, why he would run up the stairs instead of waiting for a slow elevator. But, having arrived, he could sit quietly and listen."

Dr. Appel's broadening of the concept of psychotherapy concerned individual efforts. His next contribution concerned broader efforts.

PUBLIC LEADERSHIP: THE JOINT COMMISSION ON MENTAL ILLNESS AND HEALTH (1956-61)

This was Appel's greatest contribution to twentieth century American psychiatry, and indeed the wider field of mental health. His was the spirit that ignited the fire, at a crucial time.

Dr. Appel became chairman of the Committee on Mental Hospitals of the Group for the Advancement of Psychiatry, though this was not his first choice of subjects. "But General William Menninger was persuasive, and he was older." Appel moved in in his whirlwind fashion. He did a detailed survey of mental hospitals using ten subcommittees. The findings of deprivation in these hospitals appalled him. "Why," he said, "I had no idea. This ought to be given the same thorough study that Simon Flexner gave to the diploma mills in medicine in 1909." He said it loudly as president at the annual Mental Hospital Institute on October 14, 1953, at the Veteran's Hospital meeting in April, at the Governor's Conference on Mental Health, and in his presidential address, "The Present Challenge of Psychiatry," at the annual meeting of the A.P.A. And he gave lectures on this subject around the country. The well-funded veteran's program in psychiatry was showing what could be done. Why not apply modern medicine to those snake pits? We had great crusading journalists in Albert Deutsch, Mike Gorman, and Mrs. Albert Lasker. We had Senator Lister Hill of Alabama, and Representative John Fogarty of Rhode Island, the chairmen of the finance committees of the Senate and the House. They had raised the budget of the National Institutes of Mental Health every year from twenty to fifty million dollars above what the administration had asked. The Mental Health Study Act of 1955 passed both Houses without a dissenting vote. Mike Gorman, Robbie Robinson and I wrote the informational prologue to the Act, using Appel's statistics of needs taken from his survey. The Act provided $1,750,000 to be

matched by outside funding. It was unprecedented in Congressional experience for a Commission to be charged with a study to be made by an organization yet to be created. If necessary, the organization was to be developed under the guidance of Dr. Felix's National Institute of Mental Health. The report was to be made to the President within three years. Thirty-six organizations in the health field formed a Joint Commission. Dr. Appel became president and Jack Ewalt, Chairman of Psychiatry at Harvard became Executive Director. Greer Williams, a man of national stature in journalism, and a specialist in mental health came to be the editor. He was assisted by Robert L. Robinson, M.A., Director of Publications of the A.P.A. Affairs did not always run smoothly. Part of the report had to be rewritten under the diligent and persuasive leadership of Dr. Appel. The report appeared in a volume entitled, *Action in Mental Health*, which contains ten separate books on matters needing coverage in greater depth. In order to keep the Report of the Commission from being forgotten, Dr. Appel presented the report to President John F. Kennedy in 1961.

The report was received enthusiastically but President Kennedy delivered a bombshell. When asked if he would ask immediately for legislation, he said, in effect that he would not act until mental retardation was included. This subject, and children's services as well, had been omitted because the national professional organizations had indicated that they had wanted to act independently. But the citizens' group interested in retardation was not asked, and the President's sister-in-law, Ethel, was furiously angry. Dr. Appel and a selected group went into conference and made a proposal that resulted in the sum of 4.2 million a year for two years being inserted into the budget in order to finance further study in every state. Over three thousand citizens in Pennsylvania were involved in this study. A Presidential panel of twenty persons concerned with mental retardation worked hard, and in eleven months came forward with a creditable report. Most importantly, on February 5, 1963, President Kennedy issued "Mental Health and Retardation," the first White House message on any aspect of health. On October 23, 1963, a bill entitled "Mental Health and Retardation," Mental Retardation Construction and Mental Health Centers Act was voted upon and signed. On November 22, the President was assassinated. A delay of thirty days would probably have nullified the entire effort of ten years. The economic climate was changing. John Fogarty was dead and Lister Hill had retired. Despite its weaknesses the act provided 24-hour coverage and community services for the majority of people throughout the nation. Federal legislation thus placed services to the mentally ill, especially for the aged and the poor, ahead of all other medical services.

One of the outstanding lessons of the post-war era was that psychiatry, as an integral part of the medical program of the Veteran's Administration, could (except in some areas) be far superior to our present tendency toward the isolation of the specialty.

I summarized the situation and discussed my admiration for Kenneth Appel in a speech that I delivered in 1964 at the annual meeting of the American Psychiatric Association. The address was titled "Action in Mental Health by the Private Sector," and was published.[2] "This was the true democratic process, where a private citizen, a professional leader and teacher pointed the way to a great national effort, for which the country was ready. Kenneth Appel ranks with Rush, Kraeplin, Bleuler, Freud, Adolph Meyer and William Menninger."

It seems appropriate at this point to close with comment on the era in which Kenneth E. Appel lived and made his achievements, for he was a part of the second half of the Century of Science, 1879 to 1979, beginning with the birth of Albert Einstein and the invention of the incandescent light by Thomas A. Edison, and closing with the exploration of space. This era was studied at a three day meeting of forty-five distinguished international scholars in a "Symposium of Science, Technology and the Human Prospect," held in San Francisco, April, 1979.[3]

The juxtaposition of these two events symbolizes the mutual interdependence of "pure" and "applied" science. The traditional attitude separates the difficult, the abstruse, the elegant, the fundamental and "pure" research from that which is associated with such arts as medicine, agriculture and industry. A major result of the advances during this "Century of Science" is the recognition that the physical and social sciences cannot advance without progress in both the basic and applied research. Advances in the health sciences paralleled advances in the physical. And in psychiatry, Dr. Appel played a major part in what some have called the "Golden Age of Expression" in American psychiatry, generally placed in the pre- and post-World War II era, circa 1930-70. He has had a share in bringing together the concepts of "basic" and "clinical" sciences, with his emphasis upon the patient, the ultimate focus of attention. His presidential address discusses his thoughts in detail.

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2. *Am. J. Psychiatry*, Vol. 121, No. 5, November 1964.

3. See "Symposium," 29-44, *Saturday Review*, November 24, 1979.

Memoir of Kenneth Ellmaker Appel
1896-1979

JOHN PAUL BRADY, M.D.*

KENNETH E. Appel, Ph.D., Sc.D., M.D. died at his home in Ardmore, on August 27, 1979 in his eighty-third year. He is survived by his wife, Madeleine Hunt Appel, two daughters, Mrs. Joan Carroll and Mrs. Katharine Muskat and seven grandchildren. Dr. Appel was born and raised in Lancaster, Pennsylvania where his father was a successful attorney and he graduated from Franklin and Marshall College (1915) where his grandfather was president. He earned a master's degree and doctorate in philosophy and psychology at Harvard University (1918) before becoming a Traveling Fellow at the University of London. In that city he studied physiology and chemistry under several of the scientific giants of the time, including E. H. Starling and W. M. Bayliss (1919-1920). He returned to Boston to complete the M.D. degree at Harvard Medical School (1924) and served a medical internship at the Hospital of the University of Pennsylvania (1925-26). After completing a residency in psychiatry at the Pennsylvania Hospital in the Department of Nervous and Mental Disease (1926-29), he went to Paris to study neurology under Babinski and undertake a personal psychoanalysis under Dr. Otto Rank. In 1930 he returned to the University of Pennsylvania as a member of the faculty of the Department of Psychiatry, rising to professor in 1948. Dr. Appel was appointed Chairman of the Department in 1952 and held this position until his retirement from full-time academic work in 1963. From that time until the day of his death, Dr. Appel continued to be an avid and insightful student of human behavior, a contributor to the psychiatric literature, and, as always, a patient and tireless clinician. During his long and fruitful career, Dr. Appel published over a hundred medical and scientific papers and four books.

Dr. Appel was an active member and served as president of several medical societies including the American Psychiatric Association and the American Board of Psychiatry and Neurology. He served also as president of the staff of the Institute of the Pennsylvania Hospital. Dr. Appel was elected member of the College of Physicians of Philadelphia in 1930.

Perhaps Dr. Appel's greatest impact on the field related to his appointment as President of the Joint Commission on Mental Illness and Health that was mandated by Congress to conduct a comprehensive assessment of psychiatric illness and services in the United States. The final report of this Commission, *Action for Mental Health,* was published in 1961 and became the basis of the

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Mental Health Act signed into law by President Kennedy in 1963. This bill led to the establishment of the publicly funded community mental health centers throughout the United States. The report was also a major factor in increasing federal support for research in mental illness and establishing an extensive program of training grants in psychiatry. In short, it had a profound influence on the growth and development of psychiatry in this country.

During his long tenure as Chairman of Psychiatry at the University of Pennsylvania, Dr. Appel established the Psychiatric Outpatient Service at the University Hospital, integrated the Marriage Council of Philadelphia into the Department of Psychiatry, and created the Residency Training Program. Under his leadership the department flourished with a development of one of the largest and most productive research facilities in psychiatry in the country.

Few men or women have a really lasting effect on the course of the field in which they have worked. Without doubt, Dr. Appel is among that small group of persons who have permanently altered the course of psychiatry as a branch of medicine. To recount his scientific accomplishments and leadership role in the field, however, is to run the risk of losing sight of the impact of the man as a practicing doctor. In fact, perhaps Dr. Appel's most outstanding characteristic was the tireless and dedicated manner in which he carried out his responsibilities as a physician with psychiatric patients over five decades. The enormous fund of knowledge at his fingertips and the breadth and depth of his understanding of medicine, science and philosophy were not immediately apparent to his patients because he spoke in an engaging and direct manner designed more to elicit their feelings, thoughts and aspirations rather than to reveal his own knowledge. Thus he was perceived as a gentle, understanding and patient friend.

Perhaps both the wisdom and humor of Kenneth Appel is captured in one of his favorite prayers titled "I Am Growing Older, Lord."

> Lord, thou knowest better than I know myself that I am growing older and will someday be old. Keep me from the fatal habits of thinking I must say something on every subject and on every occasion. Release me from craving to straighten out everybody's affairs. Make me thoughtful but not moody; helpful but not bossy. With my vast store of wisdom, it seems a pity not to use it all, but thou knowest, Lord, that I want a few friends at the end.
>
> Keep my mind free from the recital of endless details; give me wings to get to the point. Seal my lips on my aches and pains.
>
> I dare not ask for improved memory, but for a growing humility and less cocksuredness when my memory seems to clash with the memories of others. Teach me the glorious lesson that occasionally I may be mistaken.
>
> Keep me reasonably sweet; I do not want to be a Saint — some of them are so hard to live with — but a sour old person is one of the crowning works of the devil. Give me the ability to see good things in unexpected places and talents in unexpected people. Give me the grace to tell them so.
>
> Amen

Memoir of Charles A. W. Uhle
1904-1978

ROBERT H. BRADLEY, JR., M.D.

DEATH came suddenly to Charles Augustus Woerwag Uhle on June 4, 1978 in Greenwich, Connecticut, at age 73. He had suffered a myocardial infarction in 1970 within days of his retirement as Chief of Urology at Lankenau Hospital. Despite chronic angina he continued to pursue many interests outside of medicine until cardiac arrest occurred without warning as he greeted his son after a long automobile trip.

Charlie Uhle was identified with Lankenau all his life. He was a frequent visitor there in childhood with his father, Alexander A. Uhle, a pioneer urologist and the first to employ retrograde pyelography in Philadelphia. After the elder Uhle died from cocaine injected as an anesthetic, his son was raised in Chestnut Hill, by an aunt, Elizabeth Uhle Bromley. Friends who knew him then say that he was born with a gift of laughter and a warmth that brought him lasting friendships.

Charlie graduated from Chestnut Hill Academy in 1922 and the University of Pennsylvania in 1926 where he was active in the Mask and Wig Club. He received his M.D. degree from the University of Pennsylvania in 1930 and was an intern at Lankenau Hospital. After a year of study in Germany under Wildbolz and von Lichtenberg, he returned to take residency training in urology with Dr. Alexander Randall at the Hospital of the University of Pennsylvania. He began his practice in 1935, and was certified by the American Board of Urology in 1939.

Lankenau Hospital was the focal point of Charlie's professional life and he was intensely loyal to it. He was proud of its tradition of service and science, and of the family spirit that made it unique. He did his best to perpetuate those personal qualities when Lankenau moved to its new location in Overbrook, where he was twice president of the medical staff.

Charlie was a superb teacher. Long active in the Graduate School of Medicine of the University of Pennsylvania, he became Professor of Urology and Chairman of the Department of Urology in 1952. He fired the urologic interest of the young surgeons who knew him at the Philadelphia General Hospital, Graduate Hospital, Philadelphia Naval Hospital, Chestnut Hill Hospital, and Lankenau Hospital, where he was variously involved. A bold and decisive surgeon, he was at his best with an audience of students perched on the marble tiers of the old Deaver Amphitheater at Lankenau Hospital demonstrating the art of prostatectomy. None of us can forget the twinkling eyes, the spirited discourse, and the Roman nose that a mask could not veil. He had an inexhaustible fund of stories, and the admonition graven over the door, "Noli Loqui Noli Tangere"

could not suppress his recitation of some ribald gems.

The affairs of urological science and its organizations were frequently on Charlie's mind. He found time to contribute some 35 papers to the urologic literature. He served as President of the Philadelphia Urological Society and the Mid-Atlantic Section of the American Urological Association. He was active in the American Urological Association and the American Association of Genito-Urinary Surgeons. An inveterate collector and history buff, he devoted much energy in later years to the urological collection of the Mütter Museum of the College of Physicians of Philadelphia.

In the Churchillian tradition Charlie liked to refer to himself as a "Former Naval Person." Active duty during World War II found him in charge of urology at Naval Hospitals in Norfolk, Virginia, Philadelphia, and in London during the aerial attacks by V1 and V2 bombs. Separated from the service with the rank of captain, he continued as a teacher and consultant at the Philadelphia Naval Hospital.

Such a recitation of facts reveals a skilled surgeon and stimulating teacher but says little of the man beloved by family, patients, and associates. His son described him with these words: "He was a big man but he never saw himself that way. He had his own style, earthy, straightforward, cheerful, friendly, affectionate, thoughtful of others. He was always dependable and supportive, ever ready with some well-chosen philosophical quip to put things in perspective. He had the touch. He really did."

Someone meeting Charlie for the first time received an impression of strength. One's hand simply disappeared in his. But there was more than physical vigor about him: he inevitably brought out the best in those with whom he came in contact. He was a happy person. The happiness that he gave away so freely is the rich legacy for which he is remembered by his wife, Janet, his children, Alexander A. Uhle and Sandra Sawin, four grandchildren, and innumerable friends.

The Changing Idea of a Medical Specialty

ROSEMARY STEVENS

THE KATE HURD-MEAD LECTURE

KATE Campbell Hurd-Mead was a gynecologist. Most of her professional life was spent in private practice in Middletown, Connecticut. She was consulting gynecologist to Middlesex County Hospital between 1905 and 1925. It was only after her retirement from practice, in her late fifties, that she turned to full-time research and writing; her landmark book, *Medical Women of America,* was published in 1933, when she was well into her sixties.[1] For what most of us think of as our working lives, she was a private specialist practitioner.

But to say that Dr. Mead was a gynecologist gives only a limited, somewhat misleading, description of her work and of her perception of her role as a physician. The description may be accurate, but it is not sufficient. Dr. Mead, with many of her contemporaries, women and men, saw medicine as wider than a special avocation to a limited field of private practice. Her conception of gynecology encompassed the improved organization of services, through political change if necessary. Medicine was inextricably linked with the organization of services and social reform.

It is these questions of perception that I want to explore here. Not only as an historian but as an observer of contemporary events, it is worth inquiring into the nature of a specialty as an idea. This is not the same as tracing the history of each specialty or asking in what ways a specialty like radiology resembles neurology or obstetrics. A specialty may be focused on technologies, physiological systems, parts of the body, or population groups; there is no single definition.[2] Rather, I

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1. Kate Campbell Hurd, daughter of a physician, was born in Danville, Quebec in 1867. Her family moved to Massachusetts when she was a small child, and she received her education in the United States, graduating from Woman's Medical College in 1888. A definitive biography has not yet been written; existing materials are spotty and occasionally contradictory. A start has been made, however: see Esther P. Lovejoy, "Kate Campbell Hurd-Mead (1867-1941)," *Bull. Hist. Med.* 10 (1941): 314-317; Dorothy I. Lansing, "Kate Hurd Mead, M.D. (1888) and Her Prestigious Lectures in the History of Medicine," *JAMWA* 33 (1978): 116-123. Information about her specialty, education and professional activities used here follow the format reported by Dr. Mead for the Woman's Medical College Register of Alumnae, January 1923, Archives and Special Collections on Women in Medicine, The Medical College of Pennsylvania. I am grateful for the advice and assistance of Sandra L. Chaff, Director, Archives and Special Collections, Medical College of Pennsylvania.

2. See George Rosen, *The Specialization of Medicine, with Particular Reference to Ophthalmology* (New York: Froben Press, 1944); Rosemary Stevens, *American Medicine and the Public Interest* (New Haven: Yale University Press, 1971).

would like to ask how specialization as a movement has defined physicians' perceptions of their roles, as medicine has become formally stratified into specialties in the twentieth century. I will take, as a basis, Kate Mead's career.

The Specialty as Scientific Interest

Kate Hurd-Mead came into medicine when specialism was being formalized into professional associations, journals, university positions, and hospital appointments. The year of her graduation (1888), Abraham Jacobi became the first president of the new American Pediatric Society. Societies for surgeons, neurologists, gynecologists, dermatologists and others were already flourishing; the *Journal of Ophthalmology* was four years old; William H. Welch was established at Johns Hopkins as professor of pathology. The young Dr. Hurd took the path of many of her contemporaries — an internship (at the New England Hospital) followed by postgraduate experience in Europe. On her return in 1890 she spent three years at Johns Hopkins before marrying William Edward Mead, a professor of English, and moving to private practice in Connecticut. For a physician of her generation she was exceptionally well-trained. In addition, she was at Johns Hopkins, working with the Women's Medical Fund to raise money for the Hopkins medical school, during years critical to the development of American medical education; the medical school opened in 1893, the year she left. One way or another Kate Mead was attuned to developments in medical science and to issues confronting American medicine as it became more consciously scientific, research-based, and specialized.

Even in the 1890s the word "specialty" had distinctive and conflicting connotations. It could suggest an avocation or special interest, a defined body of skills or techniques, exclusive concentration on a field, or an organizational entity, such as a specialist association. William Osler, then at Johns Hopkins, remarked in 1892 that specialization was truly the "most distinctive feature in the medical profession of America." For Osler and perhaps for most of his contemporaries, specialism was necessary because of the rapid increase in knowledge. Fields such as ophthalmology, gynecology, and dermatology were associated with ideas of thoroughness, clarity, and accuracy; they stood in contrast to the shallow diffuseness of too general a practice, or the hurry and bustle of industrial America. While there were evident disadvantages in the idea of specialization — the danger of dividing medicine (and the patient) into disconnected parts, the possible demise of the family doctor, a tendency toward narrow pedantry — specialism was intrinsic to the scientific outlook in medicine. The specialist's ability to impose order gave comfort to the general practitioner.

> We take him a case that has puzzled and annoyed us, the diagnosis of which is uncertain, and we consult in vain the unwritten records of our experience and the printed records of our books. He labels it in a few minutes as a coleopterist would a beetle, and we feel grateful for the accuracy of his information and happy in the possession of the label.[3]

3. William Osler, "Remarks on Specialism," *Trans. Am. Pediatr. Soc.* 4 (1892): 7-8.

Yet Osler himself was, and wished to remain, a diagnostician and general physician. A student of internal medicine could not, he emphasized, be a specialist. Rather, he should act as a general consultant whose skills would be drawn from inside and outside medicine (typhoid fever, for example, might carry its student afar afield; to morbid psychology or even to surgery).[4] Generalism was necessary if only to keep abreast with changes in patterns of disease and flexibility in modes of treatment. The notion of a specialty was thus scientifically important, but functionally limiting. The true specialist was a technician, who dealt with a narrow segment of medicine. The generalist might have a special avocation or interest and draw on the skills of experts, yet medical leadership required a breadth of vision that could not be encompassed in a technical perspective.

This idea of specialized knowledge adding to the capabilities of the general physician rather than narrowing his scope was held by many leading physicians at the turn of the century, the role models for Dr. Mead. Other examples are Alfred Lee Loomis and Abraham Jacobi. Loomis, an eminent New York physician, taught classes on the diseases of advanced life in his clinic at the Bellevue Hospital, pulling these lectures together in 1881 into a book which also contained translations of lectures given in France by Charcot.[5] His lectures show careful study of conditions such as senile pneumonia, atheroma, prostatic disease, and other conditions of the elderly. This book, the first American text on diseases of the elderly, entitled Loomis to call himself the first American specialist in old age. But this honor is usually given to Ignatz Nascher, who invented the term geriatrics in 1909.[6] Loomis did not see himself as a geriatrician. After this book he appears to have published no more on the diseases of the elderly, his interests instead turning to other aspects of medicine. Loomis, like Osler, was a general physician, who from time to time espoused special interests.

Along similar lines, Abraham Jacobi, influential in the development of American pediatrics, repeatedly declared that he was not a specialist and that pediatrics was not a specialty like ophthalmology or otology. Pediatrics was, rather, "that part of internal medicine and surgery which cannot be measured by the knowledge derived from and applied to the adult; it requires special study and research in order to become both scientific and practical."[7] Pediatrics had its own independent range and horizon. As a science it needed to focus on growth and development; as clinical practice pediatrics should recognize that children were

4. William Osler, "Internal Medicine as a Vocation," (1897) in *Aequanimitas,* Third Edition (Philadelphia: Blakiston Company, 1943), p. 136 and passim.

5. J. M. Charcot, *Clinical Lectures on the Diseases of Old Age* (New York: William Wood and Co., 1881). Loomis's own lectures are numbers 22 to 31.

6. "Geriatrics, from geros, old age, and iatrikos, relating to the physician, is a term I would suggest as an addition to our vocabulary, to cover the same field in old age that is covered by the term paediatrics in childhood." I. L. Nascher, "Geriatrics," *N.Y. Med. J.* 90 (1909): 358.

7. A. Jacobi, "Introduction," *Am. J. Dis. Child.* 1 (1911): 3.

not just "miniature men and women," with the same class of disease in smaller bodies and the same drugs in smaller doses. But while pediatrics required special study and perspectives it was not to be regarded as an exclusive domain, a specialized segment of medicine. Again a distinction was to be made between a scientific interest or focus within medicine, a specialty as a division of labor, and a special education. Study and research did not in themselves comprise a specialty.

Jacobi also brought into his perspectives of pediatrics an important organizational view of generalism and specialism. Not only must the pediatrician be a generalist, whose special interests broadened rather than narrowed his horizons, the physician in internal medicine should also be a "pediatrist" so as to be of real use at the patient's bedside, and to be effective in debates about the organization and the practice of medicine. The physician should be a "sanitarian in the councils of the nation."[8] In short, physicians needed to maintain their breadth not only for clinical but for social reasons.

This conjunction between scientific generalism and medical leadership in the social aspects of medicine added representative and reformist connotations to the idea of a specialty. The physician interested in children would look outward, across the scientific barriers of the specialties, indeed outside medicine altogether, pushing for better care for a specialized constituency, in this case general improvement in the health of children.

Yet whatever the views of scientific leaders of medicine, the private practice of medicine was becoming specialized in a more restricted sense. By the early years of this century specialism was booming. By 1910, the year of the famous Flexner report, the true general practitioner was already moribund, if not dead, and the modern focus on graduate education and specialist skills was evident. Specialist groups were pleading for a visible role in the undergraduate medical curriculum. President David I. Edsall's address to the American Pediatric Society in 1910, for example, called for the elevation of pediatrics to the standards of teaching in general medicine and surgery.[9] The politics of specialization was already clear. Self-defined groups of experts would ask for inclusion in the medical curriculum, for identifiable teachers in medical school, and ultimately for ear-marked residency training programs and specialty certification.

The question remained, how far average physicians would define their role as specialists, but through the 1920s the definitions were fluid. Kate Mead's role as a gynecologist had both scientific and social perspectives. Her population of practice was limited but her interests ranged widely. Her specialty was a vehicle for social progress, rather than a narrow technical idea. In Jacobi's phrase she was a "sanitarian in the councils of the nation."

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8. A. Jacobi's introduction to I. L. Nascher, *Geriatrics. The Diseases of Old Age and Their Treatment* (Philadelphia: P. Blakiston's Son and Co., 1914), p. xv.

9. For David L. Edsall's address see Harold K. Faber and Rustin McIntosh, *History of the American Pediatric Society 1887-1965* (New York: McGraw-Hill, 1966), p. 80.

Social Reform as Specialty Interest

Gynecology, like pediatrics, inevitably linked medical research and clinical practice with the pervasive social problems of maternal and child health in the first two decades of the twentieth century. Abraham Jacobi, a strong and effective advocate in the campaign for clean milk, acted as an adviser to Nathan Straus in New York in the establishment from the 1890s of milk depots where milk was pasteurized and bottles were sterilized. The drop in the infant mortality rate in New York in the 1890s was attributed to these depots and thus indirectly to physicians interested in child health.[10]

To Kate Mead, too, the idea of gynecology as a specialty encompassed all aspects of maternal and child care. In Connecticut she set up milk stations, organized a district nurse association (in 1900, the first in the state) and a training school for nurses, and pressed for increased public funds for the care of cancer patients. But Dr. Mead went further in her notion of a specialty and a specialty role, not only seeing women as a special constituency of patients but women physicians as their natural leaders. Dr. Mead was a prominent member of the Medical Women's National Association and was its president in 1923-4. In some ways this association appears to have been an extension of her perception of her role as gynecologist.[11]

Together with other feminist and reform groups, the Association lobbied for the passage of legislation to provide federal aid to states for maternal and child welfare services; this was achieved when the Sheppard-Towner Act was passed in 1921.[12] In 1917, the year before Congresswoman Jeanette Rankin introduced the first version of the bill, Kate Mead published a persuasive account on the superiority of the Swedish over the American health system.[13] With its better infant mortality record and strong government programs, Scandinavia, she said, had chosen the better way, financially and sociologically, to conserve its babies.

Sheppard-Towner was a modest step. Meanwhile Dr. Mead called on her colleagues all over the world to work together to support legislation for women and children, to enforce the Eighteenth Amendment, to combat drugs and white slavery, and to be active in all questions of "public health and morality."[14] To Kate Hurd-Mead the practice of gynecology meant the championship of women, who were its patients.

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10. See G. F. McCleary, *The Early History of the Infant Welfare Movement* (London: H.K. Lewis & Co., Ltd., 1933), pp. 54-56; John B. Blake, *Origins of Maternal and Child Health Programs* (New Haven: Yale University Department of Public Health, 1953), pp. 13-15.

11. It is interesting, in this connection, that most of the members of the Medical Women's Association (in 1931) were in public health, obstetrics or gynecology, or pediatrics. Kate Campbell Hurd-Mead, *Medical Women of America* (New York: Froben Press, 1933), p. 80.

12. J. Stanley Lemons, "The Sheppard-Towner Act: Progressivism in the 1920s," *J. Am. Hist.* 55 (1969): 776-786.

13. Kate C. Mead, "Is Infant Mortality an Index to Social Welfare? Scandinavia's Reply," *Woman's Med. J.* 27 (Jan. 1917): 10-15.

14. Kate Campbell Mead, "Amalgamation, not Segregation," *Bull. Med. Women's Natl. Assoc.* 4 (July 1923): 42-44.

In some respects Dr. Mead's reformist views in medicine were part and parcel of her feminism. In other respects the championship of the special needs of a group of patients reflected the reformist views of Dr. Jacobi and other physicians active in public health, child welfare, and mental hygiene in the early years of the century. Kate Mead was a physician in training or active practice from the 1880s to the mid-1920s: years when conditions of women and children, particularly concerted efforts to bring down infant mortality rates, were at the forefront of concern in public health. She was a successful professional woman (with an apparently supportive husband) through the battles for women's suffrage, achieved in 1920. The condition of children and women's suffrage — the child health movement and the right to vote — were inevitably interlinked. Federal subsidy for maternal and child care, the Sheppard-Towner Act, symbolized this conjunction. Women's groups pointed with pride to the fact that the first major legislative request made upon Congress by enfranchised women was one to dignify motherhood.[15] The anti-suffragists, men and women, opposed the legislation; the suffragists fought for it. In turn, the implementation of Sheppard-Towner enlarged opportunities for medical women. A woman physician joined the Children's Bureau as consultant to the program in 1922.[16] By 1927 women physicians directed the maternity and infancy programs of sixteen states.[17] Women as physicians, women as mothers, and women as voters came together in this achievement.

The full story has yet to be told of the role of women (or for that matter men) physicians in the child health movement, but in terms of maternal and child care specialties, some roles were important and pervasive. Some are worth looking at here to illustrate further the social notion of a specialty: physicians who represented constituencies of patients in order to improve their general health status. Dr. Josephine Baker established the first Bureau of Child Hygiene in New York in 1908, a national and international model for the development of public health clinics, educational programs, and school health services. During Dr. Baker's career as director, which continued until 1923, it was estimated that the bureau saved 82,000 babies.[18] Yet, indicative of the way specialties were, and have continued to be viewed, Dr. Baker's career tends to appear in the history of public health rather than in histories of pediatrics, which tend to stress medicine's more "scientific" achievements.

15. Editorial, "Passage of the Maternity Bill," *The Survey* 47 (1921-22): 357.

16. Dr. Ethel M. Watters, an alumna of Johns Hopkins, "Announcement, Woman Consultant in Administration of Sheppard-Towner Maternity Act," *Med. Woman's J.* 29 (June 1922): 119. The first two Chiefs of the Children's Bureau were women active in social work. Julia Lathrop, selected on the establishment of the Bureau in 1912, was succeeded by Grace Abbott in 1921.

17. Bertha Van Hoosen, "Medical Opportunities for Women," *Med. Woman's J.* 34 (June.1927): 173-175.

18. "One of the World's Great Citizens, S. Josephine Baker, M.D., DPH, Director, Bureau of Child Hygiene, Department of Health, New York City," *Med. Woman's J.* 29 (Aug. 1922): 180-182.

Other women physicians were drawn to women's activities outside of their primary fields. They might be said to have a special interest in women's conditions, rather as Loomis was interested in old age. Rosalie Slaughter Morton, an alumna of Woman's Medical College, was by her own account a successful New York surgeon in 1909. She talked the American Medical Association into sponsoring state public health committees organized by medical women and supported by women's clubs. In its first year more than 2000 lectures on the prevention of disease were given to parents, teachers, and other members of the public by female and male physicians; at least one was given in every state.[19]

The networks of women involved in settlement work, public health, problems of child labor and juvenile delinquency, temperance, women's clubs and other charitable, legislative and medical activities, deserve scholarly attention, as does Dr. Mead's own role in such networks. I do not wish to labor these points here. I want merely to stress that special interests in social fields impinged upon specialty interests in medicine. To many physicians, including Dr. Mead, they were *part* of a career as a specialist.

For women physicians, perhaps, the connections between scientific and social interest in gynecology, obstetrics and pediatrics were particularly evident. The scientific societies tended to be male. The American Pediatric Society, for example, had an exclusively male membership until 1928.[20] While many woman physicians were associating with other women's groups, leaders of scientific medicine were attempting to define and to raise the prestige of their fields within a male-oriented medical profession. Medicine as science and medicine as politics were to be carefully distinguished.

Yet to suggest that a broad vision of medicine in general, or service to mothers and children in particular, was the particular preserve of women presents far too chauvinistic and distorted a picture. Many women were not interested in social reform or in working together. Bertha Van Hoosen, founder and first president of the Medical Women's Association, wrote later of the intense feeling against the organization from medical women in all parts of the United States. Only the refusal by the Surgeon-General to accept any of the five thousand women in active practice for army service in World War I shattered the prevailing mood of co-education and complacency — and made the association a success.[21]

Nor is it clear how many physicians actually saw themselves as specialists. Despite a marked tendency toward specialized practice, even before World War I, the idea of a medical specialty remained one of interest, education, and expertise, rather than of any rigid limitation of the scope of practice or even a limitation in

19. Rosalie Slaughter Morton, *A Woman Surgeon* (New York: Frederick A. Stokes Company, 1937), pp. 165-174.

20. Faber and McIntosh, p. 69.

21. Bertha Van Hoosen, *Petticoat Surgeon* (Chicago: Pellegrini and Cudahy, 1947), p. 202.

the definition of medicine to the transaction between single physician and single patient. Kate Mead's activities were those of Abraham Jacobi, at one remove. Physicians involved in the child health movement, men and women, could not see themselves as narrow specialists, whether or not their practices were confined to women or children.

While scientific societies might draw clear lines around the scope of interest of a special field, specialties in practice were still fluid. Harvey Cushing, writing in 1913, saw new alignments developing within medicine, particularly between branches of medicine and surgery, such as neurology and neurosurgery, as the work of men of a previous generation transformed practice: Huxley, Virchow, Pasteur, Lister, and Koch.[22] Obstetrics and gynecology was a case in point, where two specialties united the medical and surgical aspects of one field. As scientific fields the specialties were interconnected and dynamic. Fields such as tuberculosis, concentrating on a particular disease, had a built-in flaw. The more successful the specialists in combating disease, the less hope for a flourishing specialty. Pediatricians remained ambivalent as to whether their field would continue. While the number of full-time pediatricians increased from less than 200 before World War I to 1500 by 1930, some pediatricians still considered that the field might well die out, with the care of children relegated to general practitioners.[23]

The idea of a specialty as an avocation on the part of the physician, as a shifting body of knowledge and skills, and as a means of identifying a particular group of patients — those with tuberculosis, for example, or women or children — allowed both for flexibility as research interests changed and for a flexible public role for physicians. Kate Mead's generation had little difficulty working from a base of private practice, being involved in public health, and lobbying for legislation. The specialties were relatively non-political. Educational programs for physicians in specialties were the exception rather than the rule well into the 1930s; not until the mid-1940s did the number of residencies exceed the number of internships.[24] For those who chose a residency in the early 1930s there was a wide degree of latitude. Residencies were not yet standardized and the physician might choose training in fields such as tuberculosis, fractures, or epilepsy.

Yet change was apparent, even in 1930. The scientific aspects of specialties were soon to be divorced from the public or social aspects of these fields. Dr. Mead's generation might see a specialty as something to do. For the next generation a specialty meant a formal process of education, a gateway to a well-

22. Harvey Cushing, "Realignments in Greater Medicine," reprinted in *Consecratio Medici* (Boston: Little Brown, 1928), pp. 48, 65 and passim.

23. M. C. Pease, *The American Academy of Pediatrics, 1930-1951,* p. 113 and passim.

24. Rosemary Stevens, "Graduate Medical Education: A Continuing History," *J. Med. Educ.* 53 (1978): 1-18.

defined area of practice, a professional endorsement of skill, a certain status, an institution.

Specialties as Institutions

Surgeons established a precedent for delineating and recognizing specialty skills in the establishment of the American College of Surgeons in 1913. Four years later, ophthalmologists established the first specialty certifying board.[25] Both groups set out to impose order on segments of the profession. The college intended to standardize surgery in much the same way that medical schools were being upgraded and standardized by the AMA after the Flexner report of 1910. Recognition as a surgeon by the fellowship of the American College of Surgeons provided a mark of distinction whereby both the public and other physicians would be able to discern the qualified specialist. The formal set of requirements set up was based largely on educational attainments and proof of specialist experience. Thus the recognized surgeon, with certain exceptions, was to have completed a year of internship and three years as a surgical assistant, provide evidence that he had visited other surgical clinics and an abstract of fifty consecutive major operations.

The establishment of standards assumed that the competent surgeon could be defined. Thus surgery was formally delineated as a specialty. At the same time the American College of Surgeons provided an institutional base for surgeons, more powerful than the existing surgical associations in that it defined surgery in specific terms and used these terms as a means of entrance to the fellowship. In one sense the College was an elite, meritocratic organization. Physicians who chose not to meet the educational and experiential requirements were not eligible for election. Physicians who found it difficult to be accepted into a surgical residency for reasons of sex or race were similarly excluded from participation.[26] But the College did not intend to provide a monopoly of surgery. It offered an institutional base for surgeons with a specified standard of training and a means whereby standards of surgery over-all might be gradually raised. In these objects the College was undoubtedly a success. Surgery was becoming institutionalized around the idea of a hospital residency.

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25. The establishment of these organizations is described in Rosemary Stevens, *American Medicine and the Public Interest*, pp. 77-114.

26. The selection processes for fellowship were also highly personal. The American College of Surgeons admitted a light-skinned, black Chicago surgeon, Dr. Daniel H. Williams, as a charter member after considerable debate. Albert J. Ochsner from Chicago threatened to resign if Williams was not accepted. Yet racial discrimination was deep-seated in medicine as in society in general. As late as 1945, the College reportedly informed a New York surgeon that fellowship was not being conferred on "members of the Negro race." Loyal Davis, *Fellowship of Surgeons. A History of the American College of Surgeons* (Springfield, Ill.: Charles C. Thomas, 1960), pp. 124-126. Herbert M. Morais, *The History of the Negro in Medicine* (New York: Publishers Company, 1967), pp. 97, 135. The role of women in the College and other specialist organizations awaits further study.

Ophthalmologists were beset with more immediate pressures. Whereas the well-trained surgeon had an interest in distinguishing himself from the ill-prepared surgical enthusiast, the eye doctor wished to be distinguished from the optometrist. The American Board of Ophthalmology was established to create a "definite class of practitioners especially trained to recognize and treat the defects and disorders of the eye."[27] Again standards were based on a formal program of education. By the mid-1920s more than 500 ophthalmologists were board-certified, more than a third of all self-styled ophthalmologists in the United States.[28] Certification was also required for membership of the prestigious national associations in ophthalmology. Increasingly, therefore, recognition as a specialist in eye diseases, at least in terms of professional prestige, rested on the requirements of a peer group. As these requirements were formalized, the notion of a specialty became both more definite and less concerned with the social aspects of the field. While the specialty board undoubtedly raised scientific standards of physicians, it did not necessarily improve the eyesight of the general population. Indeed by carefully distinguishing themselves from optometrists (and refusing to teach in their programs) the ophthalmologists formalized a schism in the care of eye diseases, each group protecting its own interests.

Just as leadership in reform of undergraduate medical education derived from teachers in major universities, the stimulus to establish specialty boards came from leading teachers in the various fields. Indeed, the two movements were similar. Both assumed that standards of medical care would be raised and the public better protected if physicians were well-trained, with training programs standardized through national organizations. These were not unreasonable assumptions when only a minority of physicians were expected to specialize. Yet as other specialty boards followed, the inward-looking, scientific orientation of each field created a mosaic of relatively narrow interests. Otolaryngologists developed a specialty board in 1924, obstetricians and gynecologists followed in 1930, and there was a rash of activity immediately following. By 1940 there were sixteen specialty certifying boards. Another seven have been established since. Each board accepted the idea of a medical specialty as a professionally defined educational entity.

Proponents of the boards saw upgrading of standards in each field as a package of activities: instruction in the undergraduate curriculum, which meant in turn acceptance of specialist teachers or departments in medical schools; residency training programs in hospitals, which meant association with special hospital departments; and an examination for certification. Each of these formal structures institutionalized the specialty. Specialists were those teaching in medical school departments, teaching residents in hospitals and with board

27. Edward Jackson, "The Optometry Question and the Larger Issues Behind It," *JAMA* 57 (1911): 268.

28. Rosemary Stevens, *American Medicine and the Public Interest*, p. 114.

certificates on their walls.

As a result, by the mid-1930s the idea of a specialty was relatively simple. A specialty was a field recognized by a certifying board, with an umbrella organization (the Advisory Board for Medical Specialties) giving formal sanction to new specialty boards. The formal proliferation of new groups was limited. Gastroenterologists and specialists in tuberculosis, for example, were two groups that failed to gain approval in the 1930s. The boards simplified and defined the specialties. Obstetrics and gynecology were joined together in one field; psychiatry and neurology in another. Each board carved out boundaries based on professional judgments; each moved to elevate the standards and to advance the cause of the group of physicians each represented. Many of the boards required physicians to practice full-time in the special field. Obstetricians and gynecologists, for example, who wished to be board-certified, were not allowed to accept male patients.[29]

The structures of medical education and hospitals interlocked. As hospitals became more specialized they recognized departments similar to the divisions in medical schools. The boards certified the products of specialist hospital departments. The idea of a medical specialty was associated with contemporary educational and professional ideals: scientific rigor in a limited field, professional prestige and good performance as a private practitioner. Public health and organizational aspects of a field tended to be down-played as non-scientific or seen as irrelevant to hospital residencies.

Kate Hurd-Mead had retired before a specialty board existed in her field. She left private practice in 1925; the board of obstetrics and gynecology was founded in 1930, the board of pediatrics in 1933. She herself had pressed for better undergraduate preparation in obstetrics and pediatrics. There could be little opposition to the development of certification which would raise standards of graduate medical education.

Yet the shift in the idea of specialties to one of educational and scientific entities coincided with a period of conservatism in medicine. Notions of science, specialty excellence and traditional modes of practice were combined. By the 1920s private office practice was being affirmed as the cornerstone of scientific medicine. Perhaps the pursuit of scientific exactness encouraged conservatism because of the need of physicians outside the major medical centers (or this desire) to rely on medical authority in order to understand the rapid changes in medical thought in these decades.[30] Authority lay with specialization. Perhaps the

29. "The Board [of Obstetrics and Gynecology] has ruled that physicians who accept male patients in their private or other practice, for operative or other care, cannot be regarded as specialists in obstetrics and gynecology." Advisory Board for Medical Specialties, *Directory of Medical Specialists 1939* (New York: Columbia University Press, 1940), p. 255.

30. This point was made at the time. See Bernhard J. Stern, *Social Factors in Medical Progress* (New York: Columbia University Press, 1927), p. 33 and passim.

political stance of organized medicine, the reactive conservative positions of the AMA through the 1930s, spilled over to chauvinistic views in specialist education. Whatever the reason, medical specialties became associated within medicine with a limited body of knowledge and with professional institutions. Breadth gave way to expertise. Involvement in public health, central to the development of pediatrics, obstetrics, and gynecology up to the 1920s, became a peripheral activity, far less prestigious than private office practice (and sometimes politically suspect).

Pediatrics, for example, like other self-conscious specialties, was looking inward by the 1930s, moving away from concern over infant welfare as a social issue to a strong stand for private practice. In 1935, Borden Veeder, who had been influential in establishing the pediatrics board in 1933, spoke about trends of pediatric education and practice. While recognizing that the child welfare movement was an important force in establishing pediatrics as a field, he warned of the future danger of sociologists and welfare workers:

> who as a group have a very limited background and heritage of experience as compared with the medical profession, attempting through social legislation to extend the clinic or public health method, which is at best inferior to continuous individual supervision throughout infancy and childhood by the trained and qualified physician.[31]

The trained and qualified physician was a pediatrician in private office practice. Thus medicine, science, and private practice were assumed to be inextricably linked. Kate Mead's activities of fifteen years before were truly those of a different generation.

Women physicians, including those active in the child welfare movement, were outside the emerging power structures of the specialties. There were no women, for example, on the early boards of obstetrics and pediatrics. The pride felt by medical women in the number of women directors of state maternal and child health programs in the 1920s was offset by the fact that specialty leadership in the 1930s came out of the medical schools — there were few women professors.[32] As interest in women's issues declined, gynecology as a specialty became divorced from women as a special constituency. The relatively small number of women in medicine was emphasized when the first directory of certified medical specialists was published in 1940. Even in obstetrics and gynecology the overwhelming majority of physicians were men. In Philadelphia, for example, forty-one males were certified and three women: all of the latter were graduates of Woman's Medical College.[33]

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31. Borden S. Veeder, "Trend of Pediatric Education and Practice," *Am. J Dis. Child.* 50 (July 1935): 3.

32. A survey in the late 1920s found 198 medical women teaching in medical schools, but most were instructors or assistant professors. Outside of Woman's Medical College, there was one woman department head, at Loyola University Medical School, Chicago. Bertha Van Hoosen, "Medical Opportunities for Women," *Med. Woman's J.* 34 (June 1927): 173-175.

33. *Directory of Medical Specialties,* pp. 324-327, supra note 29.

In some ways, too, traditional male and female imagery had pervaded medicine. Specialties were scientific, hard, and exact — presumed attributes of men. Generalists, including general practitioners and physicians in public health, were "soft." Prestige rankings within medicine emphasized specialists; generalists were left with an indeterminate status. At the same time the rules of several of the boards made the lines between generalists and specialists much more rigid. To be certified as an anesthesiologist in the 1930s, for example, a physician had to commit 100% time to the specialty. He/she could not run a clinic at the same time, nor even admit to diagnosing a cardiac patient. The generalist with specialist avocation — an Osler, a Loomis, a Jacobi — was in danger of disappearing altogether. The idea of a specialty had become associated with skills and status, with practice boundaries, interest groups, and recognition in the hierarchy of medicine.

This view of a specialty as skills and status has largely prevailed to the present.

The Specialty as a Force in Medicine: Geriatrics as an Idea

Forces which lead to the foundation of institutions are specific to time and place; the specialty boards were no exception. Pediatrics, for example, cannot be considered historically outside the reference of the child health movement. The question arises as to what has happened to potential specialty areas which for one reason or another have not been subject to pressures to formalize as specialties — for which, for example, there was no single technology or scientific focus, no effective lobbying group, no sustaining social movement, no competitive threat of a rival profession. Geriatrics was one such field which did not make the transition from special interests to a formal structure of a specialty during the period when pediatrics was developing. Numerous other special interests have been evident over the years, from hand surgery to sports medicine. The idea of a specialty is once more subject to definition.

Geriatrics is a useful illustration of both historical trends and contemporary attitudes to specialties. Aging has been of special interest since the mid-1960s because of the growing visibility of the elderly population. The term ageism has entered the vocabulary; old age is being reinvented as a period of living, rather than a period of decline.[34] Research on aging has developed in volume and respectability, buttressed by special government agencies. In some respects these movements create a context for the elderly similar to the context for children in the child welfare movement of the first two decades of the twentieth century. Yet in the meantime ideas towards medical specialization have changed. While medicine has become more advanced scientifically, the social aspects of the specialty are unclear. There is some question whether physicians, who provided leadership in improving the health of children in the 1920s, will see the elderly in the 1980s as a special medical constituency — or whether, indeed, they should.

34. See, e.g., Robert N. Butler, *Why Survive? Being Old in America* (New York: Harper and Row, 1975).

The word "geriatrics" was coined by an almost exact contemporary of Kate Hurd-Mead, Ignatz Nascher.[35] Scientific interests in the elderly as a physiologically distinctive group had sparked a number of works on old age in Europe by the end of the nineteenth century and it was not unreasonable to expect that research and practice in the diseases of old age would be developed in the United States in parallel to research on development in children. Other physicians besides Nascher (and earlier, Alfred Lee Loomis) saw geriatrics as of scientific and special interest. A meeting of the New York Geriatrics Society in 1915 drew, among others, Robert T. Morris, Edward W. Lee, and Howard Lilienthal.[36] Just as there were theories of child development, theories of aging were developing and there was at least a possibility that geriatrics would develop, along with pediatrics, as a specialty based on a specific age group. Dr. Nascher, then a private practitioner in New York, saw the parallels quite clearly.[37] Old age could be seen as a normal stage of life which deserved special attention from physicians, yet there had been little or no interest by physicians in the need for special medication in the diseases of senility, or much interest in the specific actions of drugs in old age. Indeed, physicians tended not to examine old people, or to give them only a cursory look.[38] American medical schools of the time gave no lectures on old age and there was little in the medical literature on geriatric medicine. The field appeared ripe for development through research and education, and through medical sponsorship of a neglected population.

Yet there was little support for geriatrics as a specialty between 1909 and 1920, inside or outside the medical profession. Nascher's major contribution to the field, his textbook on geriatrics of 1914, was turned down by several publishers before being accepted.[39] While Nascher delivered lectures on geriatrics at Fordham University and Boston University, he had no prestigious university appointment. He founded the New York Geriatrics Society and started a section on geriatrics in the journal, *Medical Review of Reviews,* but he had few full-time followers. In 1918 Malford N. Thewlis, his disciple, described him as about the only specialist in geriatrics in the United States.[40] It could be claimed (and was)

35. Ignatz Leo Nascher was born in 1863 and died in 1944. His parents immigrated to the United States from Vienna when he was an infant. On his life see Malford W. Thewlis, "In Memoriam. Nascher — Father of Geriatrics," *Med. Times* (May 1945): 140-141; Joseph T. Freeman, "Nascher: Excerpts from his Life, Letters and Works," *Gerontologist* 1 (1961): 17-26.

36. Thewlis, "In Memoriam," supra note 35.

37. Supra, note 6.

38. Malford W. Thewlis, "Geriatrics, a Neglected Branch of Medicine," *Med. Rev. Rev.* 24 (1918): 486-489.

39. Supra, note 8.

40. Malford Thewlis, "The History of Geriatrics," *Med. Rev. Rev.* 24 (1918): 285-288.

that commercialism was the reason for general lack of interest in the elderly by physicians and big business: no money was available from foundations to set up research institutes. Dr. Nascher's career outside major medical schools was probably a detriment to a drive for specialist education. His removal to the Department of Public Welfare in New York in 1916 labeled him clearly as a humanitarian interested in the poor rather than as "scientific." Yet he continued to be optimistic. In 1919, the year of the second White House conference on children, he wrote of the future development of special geriatric hospitals, laboratories, and specialists, to be devoted exclusively to the care of the aged, with a clear base in the physiology of growth and development.[41]

The social history of geriatrics is a neglected area of research,[42] yet, for whatever reason, an organized base for geriatrics did not develop. The elderly, unlike children, were not visible in the earlier years of this century, or were visible but regarded as unappealing, socially unproductive, or a nuisance. Children's services were well accepted; old age pensions ran into difficulties. Within medicine, too, the elderly were not generally regarded as interesting. Old people were thought to react less vigorously to mental and moral stimuli than the young: "They may become vicious, very self-centered, or are apt to lose control of the higher centers and display an unreasoning irritability."[43] Specialization focused on disease and cures. As long as old age was seen as a period of decline and decay, a period of involution, with the first signs of senescence regarded as a "tragic joke" and the elderly as biologically useless,[44] there would be little scientific impetus for physicians to move into research fields on aging. Here was neither the context of social support that existed in the child welfare movement, nor the body of practitioners who would provide championship for the elderly as a constituency — as existed for example for women in the pediatrics or obstetrics associations or in the Medical Women's National Association.

Meanwhile the institutionalization of medicine into specialties with educational tracks and specialty certificates transformed the context of debate. In 1940 a minority of physicians were full-time specialists and a minority of these were board-certified. Today, virtually all physicians expect to be board-certified. The medical profession has become a federation of specialties, defined and ordered through graduate education. Following the recognition of board certification for classifying physicians by government agencies in World War II,

41. Introduction to Malford W. Thewlis, *Geriatrics: A Treatise on Senile Conditions, Diseases of Advanced Life, and Care of the Aged* (St. Louis: C. V. Mosby, 1919), p. 9.

42. Literature about geriatrics as a scientific field, including the history of scientific research on aging is, however, becoming available. See M.D. Grmek, *On Aging and Old Age; Basic Problems and Historical Aspects of Gerontology and Geriatrics,* Monographiae Biologicae 5, No. 2 (The Hague: W. Junk, 1958), pp. 59-160; Joseph T. Freeman, *Aging. Its History and Literature* (New York: Human Sciences Press, 1979).

43. Editorial, "Old Age," *Med. Rev. Rev.* 24 (1918): 193-194.

44. See, e.g., Aldred Scott Warthin, *Old Age: The Major Involution* (New York: Paul B. Hoeber, 1929), pp. 73, 175 and passim.

the boards acquired (or had thrust upon them) administrative and strategic functions within medicine. With each group seeking specialist rank, the idea of a specialty moved once again. A specialty meant recognition as an important segment of practice within medicine. Physicians in fields such as preventive medicine, public health or general practice saw no reason why their functions should not carry equal rank — and the search for status was at least one reason for the establishment of the American Board of Preventive Medicine in 1948 and the American Board of Family Practice in 1969.[45] In turn, the recognition of such relatively general fields defined a specialty as any field for which special educational tracks could be justified. The most recent entrant is the American Board of Emergency Medicine, approved in 1979.

There is no specialty board for geriatrics. Contemporary views within medicine see geriatrics as an avocation of internists, family practitioners, or psychiatrists rather than a defined practice segment. Thus, recent reports call for encouragement of research in geriatrics and incorporation of special courses on aging and the elderly in medical schools but not for a specialty board.[46] The American Geriatrics Society, among others, does not recommend the creation of a specialty. In some respects the views towards geriatrics from within the medical profession are similar to Jacobi's views early in the century that pediatrics is not a specialty. It is held that the problems afflicting the elderly are not too different from those of a younger generation, that there is no discrete body of research on aging, and that there is no such thing, chronologically, as a geriatric population.[47] Thewlis suggested in the 1950s that patients came within the scope of a geriatrician in their forties.[48] If so, geriatrics cannot be neatly distinguished from internal medicine. But nor, for that matter, can family medicine or emergency medicine. The greater the number of specialties, the less is each a discrete segment of practice. The idea of a specialty as division of labor has become confused already. The fact that specialty boards developed in response to the ideology and internal politics of the medical profession, as well as to scientific change, adds further definitional difficulties. What, then, is a medical specialty?

And Next?

In the past twenty years debates over specialty status have tended to conceptualize a specialty as something concrete: as a function in medicine, such as the role of the family practitioner or the importance of full-time physicians in the emergency room, and as a viable postdoctoral curriculum. Yet, as I have suggested

45. *American Medicine and the Public Interest*, pp. 330-331, 312-314 and passim.

46. See, e.g., Institute of Medicine, National Academy of Sciences, *Aging and Medical Education* (Washington, D.C., September 1978).

47. August G. Swanson, "The Role of Geriatrics in Medical Education," *J. Med. Educ.* 54 (Jan. 1979): 59-61.

48. Malford W. Thewlis, "History of the American Geriatrics Society," *J. Am. Geriatr. Soc.* 1 (1953): 3-8.

here, a specialty is as much an idea as an organization. The ideas which Osler associated with specialties — science, practicality, and thoroughness — continue in perceptions within medicine. Internal medicine has retained its image of exactness through stressing the skills of diagnosis.[49] Family practice runs the risk of criticism as diffuse, and therefore as "non-scientific." Geriatrics would have a similar problem of definition.

Both geriatrics and family practice have the additional problem of associating a specialty with social aspects of medicine. The divorce of "science" and "politics" in medicine, apparent in the 1930s, reverberates in present debates. It is still difficult for professional groups to present a field at one and the same time as both socially responsive and scientifically rigorous. I suggest that these difficulties are largely questions of the perception that something broad cannot at the same time be scientific. Family practice may break through the barrier with epidemiological studies. Surgical manpower studies suggest a broader planning function for the surgical specialties. Nevertheless, the schism is still largely present.

Such considerations raise anew questions of the purpose of medical specialties. With the crumbling of the idea of specialties as discrete areas of practice, and with a proliferation of subspecialties (internal medicine alone offers nine formal subspecialties), the idea of realignments within medicine has reappeared. Harvey Cushing's versions of realignments among different fields have not been borne out; neurology and neurosurgery, for example, still require distinct careers. But in other areas new connections are being made. Allergy (1972), nuclear medicine (1971), and emergency medicine (1979) are relatively recent fields, formally recognized as specialties, that combine interests across otherwise distinct areas of practice. There promise to be others in the future: the medical and surgical aspects of oncology, for example, or the treatment of stroke. Recent reports are also stressing the need for cooperation among specialties (and specialist training) in university teaching centers.[50] In these respects, the definition of a specialty in the future promises to be less rigid. The idea of a specialty as a defined educational pathway — the hallmark of specialization from the 1930s to the 1970s — may give way to greater educational flexibility in the 1980s.

Looking backward, one can trace particular specialties from an embryonic form as a part-time interest, to formal definition through educational programs,

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49. Thus the training requirements for board certification note: "It is essential that the internist have skills to conduct a well-organized, complete, and critical interview, perform a thorough physical examination, organize clinical data into logical diagnoses and plans for study and management, and transmit to another physician the information thus obtained." *Directory of Residency Training Programs '78-'79* (Chicago: American Medical Association, 1978), p. 59. Presumably such skills apply to other specialties. The American Board of Internal Medicine is unusual in that it makes the statement.

50. See Association of American Medical Colleges, *Graduate Medical Education Proposals for the Eighties* (Washington, D.C.: AAMC, January 1980).

examinations, and full-time practice. For some fields, such as obstetrics-gynecology and pediatrics, the social context was important as a defining force. For others, such as ophthalmology, rival professions were a catalyst. For some there was concern about standards within medicine; others were more concerned about status. The idea of a specialty has thus acquired a battery of meanings, with scientific, social, and status implications. The appearance of specialty boards added an important organizational ingredient. Yet the existence of organizational structures does not solve or remove the philosophical issues. To think about the changing notion of a specialty is to consider the evolving ideology of medicine.

This ideology rests in part on the notion of "science" in medicine, and in part on the importance ascribed to "generalism," whether defined as a broad view of the practice of medicine among physicians or as encompassing wider social questions. The idea of scientific generalism espoused by Osler and others was largely replaced by the identification of science with specialism. The association of a special scientific interest with reformist views, such as in Jacobi's career, gave way to science-as-conservatism.

The various notions of a specialty over the years have brought tidiness and order to the internal organizational of the medical profession. Some such divisions are clearly necessary. Yet, coming back full-circle to Kate Hurd-Mead's career, there remains the idea of a specialty as leadership of a constituency of patients. It is here that the field of geriatrics raises interesting analytical questions. If geriatrics is not organized as a specialty, will there be medical leadership for improving services to the elderly population? Who is to ensure that stroke patients, for example, receive optimal rehabilitation? If these are not functions of one or more specialties of medicine, they may not be functions of medicine. It is a matter of some practical interest to know how far physicians will be prepared to speak, as advocates of groups of patients, as "sanitarians in the councils of the nation."

Historians, like other critics, should declare their interests. It is my hope that the notion of scientific generalism will be restored to medicine and that groups of physicians will see themselves as spokesmen for groups of patients, whatever the label of their specialty. I have argued elsewhere that geriatrics should be recognized as a specialty, if only to provide continuity of interest in aging and the elderly as present enthusiasms (and funding programs) fade.[51] One could argue equally well that specialties as a whole should become less important. Competition among physicians in the 1980s may, in any event, turn the eyes of physicians outward, away from the confines of a narrow field. Thus the idea of a

51. "Geriatric Medicine in Historical Perspective: the Pros and Cons of Geriatric Medicine as a Specialty," Working Paper #1, *Tulane Studies in Health Policy* (New Orleans: Tulane Department of Health Systems Management, April 1977).

specialty may once more change — away from structural segmentation in medicine and the rationale for new educational divisions to more flexible educational programs, more fluid practice lines, and more involvement with health delivery. I like to think Kate Mead would have relished such changes. But these are questions for historians of the future.

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Legionnaires' Disease: A New Awareness

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The discovery of Legionnaires' disease and its agent has resulted in an increasing interest in bacteriology and epidemiology, two disciplines that in some ways seem more characteristic of the nineteenth century than our own. The techniques used in both disciplines are relatively simple and easily understood. Further, the major epidemic bacterial diseases of the last century have become less and less common, in large part because, by providing clean water, by installing privies, and by improving the quality of housing and nutrition, people have changed their environment so that many infectious agents spread less readily. However, even before Legionnaires' disease was recognized, there had been something of a revival in interest in both epidemiology and bacteriology. In epidemiology the basic technique of comparing rates had begun to be applied to diseases and conditions other than infections, and in bacteriology we had begun to recognize that some diseases were becoming more common rather than less common and that some infectious agents remained to be discovered. The latter situation is illustrated especially well by diarrhea. In the last few years there has been growing awareness of a wide variety of bacteria not previously recognized that cause a significant number of cases of diarrhea: *Yersinia enterocolitica, Campylobacter fetus,* halophilic vibrios, toxigenic *Escherichia coli* and *Clostridium difficile.*

Pneumonia is a disease in which extant knowledge is expanding and old ideas are breaking down, much as happened with diarrhea ten years ago. Pneumonia is an important cause of illness in this country. There are probably 2.5 million cases a year in the United States.

Often the cause cannot be determined with certainty. In order to suggest the specific etiologic diagnosis, when a patient is first seen, a good specimen of sputum is necessary, and such specimens often are not obtained and examined. It is also necessary to culture appropriate specimens of blood and sputum, or specimens obtained aseptically from the lower respiratory tract. Before the outbreak of Legionnaires' disease that occurred in Philadelphia in 1976, probably one-third of the cases of pneumonia observed in this country could not be diagnosed with the conventional methods used. That is, there were 800,000 cases a year of pneumonia in which a causative agent could not be found despite attempts to cultivate bacteria and viruses and to use serologic techniques for identification of the viruses and *Mycoplasma* that cause pneumonia.

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What did physicians do when they saw a case of pneumonia in which they could not make a specific diagnosis? Some cases were called viral pneumonia, usually without an attempt to identify the virus. Some were called partially treated pneumonia, especially when microorganisms were seen in sputum but did not grow in the laboratory. Some were called anaerobic bacterial pneumonia; several years ago it was common to assume that anything that did not grow was an anaerobe. Other times we would mutter about the technique of our laboratory friends; if the bacterium did not grow, we assumed that the laboratory procedures had been carried out incorrectly. In support of that attitude, we noted that one-half of the patients with bacteremic pneumococcal pneumonia had negative sputum cultures for pneumococcus even when the pneumococcus could be seen in the sputum.

During my first year of residency at the Hospital of the University of Pennsylvania, I was in charge of the medical intensive care unit when a West Philadelphia man in his early fities was brought to the emergency room with overwhelming pneumonia. He was admitted to the respiratory intensive care unit and placed in the last available bed. Two hours later his wife was brought into the emergency room with equally severe pneumonia. As the only bed available was in the medical intensive care unit, I cared for that woman — attempting to make a diagnosis and to keep her alive — for eight hours until her husband died; she was then transferred to the respiratory intensive care unit where she died approximately four hours later. When impression smears of the lungs of both patients were made during the postmortem examination and examined immediately with a microscope, we found gram-negative bacilli.

About three or four weeks later, after culture results had been reported as negative, these cases were the topic of a mortality conference. After the clinicians had expressed their bafflement, the pathologists announced that silver stains of lung tissue showed that these were cases of Q fever. As a young and cocky epidemiologist and clinician, I could not believe that these two persons who lived in the middle of West Philadelphia, had simultaneously had fatal Q fever. The pathologists held to the diagnosis but I now believe that those two patients had Legionnaires' disease or perhaps one of the other severe bacterial pneumonias that we had not recognized previously, and, at the time, were not prepared to consider. Now I think we are becoming prepared.

This was the context in which the 1976 Philadelphia outbreak of Legionnaires' disease occurred. Since that time the study of pneumonia has been revolutionized in many ways. It has been a revolution not of techniques— although the techniques used in the laboratory have received great attention— but rather of attitude, of receptivity. We are ready to see facts that did not fit the old forms and to seek new forms. We are also recognizing increasingly that some of the changes that people have made in their environment have increased, not decreased, the risk of acquiring bacterial disease.

Legionella pneumophila, the bacterium that causes Legionnaires' disease, is unusual. It does not grow easily on most types of agar. Dr. Robert Austrian notes that *L. pneumophila* will grow on blood agar but it takes a month. *L. pneumophila* grown on agar is gram-negative, but in long tissue obtained from fatal cases the organism cannot usually be stained with the tissue modifications of the Gram stain. This was one reason why the disease was not recognized for many, many years. *L. pneumophila* can be stained with a modification of a silver stain initially described by Dieterle in 1927 for the staining of spirochetes, but this stain was not often widely used on lung tissue before 1977.

The organism produces browning of many media. Apparently this change occurs through the production of melanin, since if the media are supplemented with L-tyrosine or L-phenylalanine, the discoloration is increased. Under long-wave ultraviolet light the bacterium gives off a yellow fluoresecence on agar. It contains a curious preponderance of branched-chain fatty acids, quite unusual for a gram-negative bacterium. Since six different serogroups of *L. pneumophila* have been described, it is difficult to make a diagnosis on the result of direct or indirect immunofluorescence. The organism has the striking ability to survive for a long time in water—up to a year in tap water at room temperature. This may well relate to the epidemiology of the disease (see below). Since it is somewhat resistant to a number of common disinfectants, it may cause problems in the laboratory; moreover this fact must be kept in mind when control of the organism in the environment is considered.

In my opinion the most curious thing is the fact that *L. pneumophila* causes two diseases: Legionnaires' disease and Pontiac fever. Legionnaires' disease is the name given the illness that affected those who attended the American Legion convention in Philadelphia in 1976. Pontiac fever is named for an outbreak that occurred in 1968 in a health department building in Pontiac, Michigan. Because I reserve the terms Legionnaires' disease and Pontiac fever for these two clinical and epidemiologic syndromes caused by *L. pneumophila,* I shall use the term legionellosis to refer to any infection caused by *Legionella.*

Legionnaires' disease, as seen in the Philadelphia outbreak and elsewhere, has an incubation period of two to ten days, with an average of five and one-half days. It has a wide range of symptoms: fever, cough, myalgia, chills, headache, and chest pain. Sputum is produced by about half of the patients, and in half of these it is purulent. Legionnaires' disease is not uncommonly associated with diarrhea and confusion. These symptoms are not typical of pneumonia caused by other agents and hence helpful in suggesting the diagnosis of Legionnaires' disease. In outbreaks of Legionnaires' disease, 90% of affected patients have pneumonia. Pleural effusions are common but small. Extrathoracic organs commonly involved include kidney, liver, gastrointestinal tract, and central nervous system. Sixteen percent of the persons who had this disease in the Philadelphia outbreak died; approximately the same case-fatality rate has been calculated for other

outbreaks and for sporadic cases in which erythromycin was not used. Approximately 4% of the exposed people in the Philadelphia outbreak became sick. Attack rates in other outbreaks have ranged from 0.1% to 5%.

Pontiac fever is different. The incubation period is much shorter: five to sixty-six hours, with an average of thirty-six hours. Although Pontiac fever produces many of the influenza-like symptoms of Legionnaires' disease, there is no pneumonia or involvement of the kidney, gastrointestinal tract, or central nervous system. No one has died of Pontiac fever. The attack rate (proportion of exposed persons who become sick) of Pontiac fever has averaged about 9%, strikingly different from that of Legionnaires' disease. The bacteria that cause Legionnaires' disease and Pontiac fever have been indistinguishable in the laboratory up to the present time. How these bacteria can cause two strikingly different diseases is a mystery.

Legionnaires' disease occurs both sporadically and in outbreaks. By September 1979, 1,005 sporadic cases had been reported in the United States, and 22 outbreaks of *Legionella* infection had been investigated. *L. pneumophila* had been found to be a major source of both nosocomial and community-acquired pneumonia. There are probably 25,000 cases a year of *L. pneumophila* pneumonia in the United States. This estimate comes from a prospective study made by Dr. Hjordis Foy and her colleagues; their investigations suggest that 1% of pneumonia cases are cases of Legionnaires' disease. The disease more often affects the middle-aged and the old than the young people; men more often than women; and more often persons who smoke cigarettes or who drink alcohol to excess than those who do not. Travelers, people who live near construction or excavation, and construction workers are at higher risk of acquiring Legionnaires' disease than is the general population.

To illustrate the understanding that we have achieved during the course of the last four years concerning how *L. pneumophila* spreads, what the sources are, and how one might control it, it is useful to describe four outbreaks of Pontiac fever or Legionnaires' disease. But first, it is necessary to describe the engineering of heat-rejection systems, especially cooling towers and evaporative condensers. The function of these units is to dissipate heat to the environment by evaporation of water. In a typical air-conditioning system for a middle-sized commercial building, hot water is carried from a compressor (where the refrigerant gas has been compressed and heat liberated) to the top of the cooling tower, where it is sprayed over inert material and collected in a pan at the bottom. In a mechanical-draft cooling tower, a fan at the top of the unit draws air in through the base and up past the falling droplets of water. In this process hot water is exposed to air, and perhaps 1% of it evaporates and another 0.1% leaves the top of the cooling tower as small droplets of water. The water collected at the bottom of the cooling tower is recirculated to the compressor, where it is heated again and returned once more to the top of the cooling tower. From time to time, because of the

evaporation and loss of water droplets, water must be added to this closed system. The small droplets of water released at the top of a cooling tower contain whatever minerals or microorganism are present in the warm recirculating water in the cooling tower.

An evaporative condenser is similar to a cooling tower except that the water, instead of being sprayed over an inert surface, is sprayed directly over metal coils that contain the refrigerant gas. Often such a system is located inside a building and not, like most cooling towers, on the roof. However, both systems may spread droplets containing microorganisms.

The original epidemic of Pontiac fever occurred in July and August of 1968 in Pontiac, Michigan. The first case was July 1, and there was an explosion of sixty-seven cases on July 2. A small break in the occurrence of cases from July 6 to 8 apparently corresponded to the weekend of July 6 to 7, when the air-conditioning system was turned off. New cases began to occur approximately thirty-six hours after the air-conditioning system was turned back on again, on Monday morning, July 8. Ninety-five of 100 people who worked at the Pontiac Building of the Oakland County Health Department eventually had this illness. The attack rate was higher among persons who worked there than among visitors, but several of the investigators from the Center for Disease Control (CDC) also became ill.

The fact that so many people were affected—many had done nothing but enter the building and leave—suggested that the agent was spread through the air. The fact that those who were in the building only during the weekend when the air-conditioning system was turned off did not become ill until thirty-six hours after the system was turned back on suggested that the air-conditioning system was involved in the spread through the air.

To test that hypothesis, Dr. Arnold Kaufmann and his colleagues placed guinea pigs in the health department building in the summer of 1968—long before the causative agent of Pontiac fever was identified. Guinea pigs exposed to unfiltered air in the Pontiac Building and not given antibiotic prophylaxis were found to have nodular pneumonia when they were killed. Ten years later, when the pulmonary tissue of these guinea pigs was retrieved from the freezers and cultured with the techniques we now know are useful for culturing *Legionella, L. pneumophila* serogroup 1 was found.

The air-conditioning system in the health department building in Pontiac, Michigan included an evaporative condenser and an air chiller in the basement. Exhaust from the evaporative condensor was blown up a stack to the roof and out through one side of a "doghouse." The fresh-air intake for the building, unfortunately, was located just on the other side of the doghouse. Smoke studies showed that the exhaust air from the evaporative condenser could recirculate into the fresh-air intake for the building. Fresh air was drawn into the air chiller, cooled, and then sent out through any of several chilled-air ducts. Investigation of this air-conditioning system showed a second defect: where the evaporative

condenser exhaust duct crossed one of the chilled-air ducts, a puddle of water was found in the latter. A crack in the common wall of these two ducts had permitted water droplets from the evaporative condensor exhaust to collect in the duct for fresh chilled air.

Guinea-pigs exposed at CDC in 1968 to aerosols of water from the evaporative condenser also had nodular pneumonia. Ten years later, cultures of pulmonary nodules from these guinea pigs also contained *L. pneumophila.*

The evidence is convincing that Pontiac fever was caused by airborne spread of *L. pneumophila* in the evaporative condenser water which was released as a mist and, because of defects in design and structure, was recirculated into the building. Clearly, the source and mode of spread had been proved in 1968, long before the agent was identified. The remarkable series of experiments done in 1968 was extraordinarily helpful to those who were investigating Legionnaires' disease once it was recognized that the two syndromes are caused by the same species of bacterium.

In 1978, an outbreak of Legionnaires' disease in Memphis, Tennessee was much like the outbreak in Pontiac, Michigan. On August 8, Memphis suffered a violent rainstorm. The consequent flooding inactivated the main cooling tower in one hospital and made it necessary to turn on an auxiliary cooling tower that had not been used for two years and had not been receiving chemical treatment. The auxiliary cooling tower was used until September 9, when it was shut off. Beginning August 11, there was a large cluster of cases of Legionnaires' disease in Memphis. Of forty-four cases in August and September, thirty-nine affected persons who had been patients in, employees at, or visitors to the hospital during the two weeks before they became ill. Comparison of these forty-four persons and forty-four controls matched for age, sex, and hospital of admission showed that in nineteen of the pairs, the sick person was an employee or a patient at the hospital and the control was not, whereas with only two pairs the converse was true. The attack rate of Legionnaires' disease was highest (3.4 per 1,000) among overnight visitors to this hospital during this period, but rates were nearly as high among patients and employees at the hospital. The rates were much lower among persons who had had no contact with the hospital.

The hospital was nine stories high. The auxiliary cooling tower that was put into service on August 8 was situated in front of the main hospital on the roof of a one-story projection that contained the admissions department. The air-conditioning system had several air intakes. Most were nowhere near the auxiliary cooling tower, being either on the roof of the nine-story building or on the other side of that building. Only two intakes drew air from a place that would be expected to be contaminated by mist released by the auxiliary cooling tower. Dr. Timothy Dondero and his colleagues analyzed the attack rate of Legionnaires' disease for hospitalized patients according to the location of the air intakes serving each hospital room. Patients in rooms served by the air intakes near the

auxiliary cooling tower had an attack rate of 2.8 cases per 100-bed months. The rate for patients in other rooms was significantly lower.

On September 9, the auxiliary cooling tower was turned off and wrapped in plastic sheeting. The outbreak stopped nine days later—just as one would expect with a disease that had an incubation period of two to ten days. *L. pneumophila* was grown from the two samples of water taken from that cooling tower. Smoke pencil studies showed that mist released from the cooling tower would travel up the side of the hospital building and into the nearby air intakes. In summary, in the Memphis outbreak of Legionnaires' disease, the causative agent seems to have spread in the same fashion as the one that caused the outbreak of Pontiac fever.

A few other outbreaks have provided information about source and mode of spread of *L. pneumophila.* One affected people who cleaned a steam turbine condenser at an electric power plant in James River, Virginia, in 1973.

A steam turbine condenser is another device for dissipating heat into the environment and in some ways serves the same function as a cooling tower. In the James River plant, river water was used to cool steam. The water was brought into one end of a cast-iron chamber, passed through two series of small copper alloy pipes, and sent back to the river. In the process, the water absorbed heat from steam passing over these pipes. Every few months when these pipes became clogged with rocks, silt, and fish and other objects in the James River, it was necessary for men to enter the condenser and blow out the pipes with compressed air. Ten men did this in 1973, and all ten had an illness identical to Pontiac fever seventeen to forty-two hours after exposure. Specimens of serum saved since 1973 were tested; they yielded evidence that these men had been exposed to *L. pneumophila* and in addition it was suggested that the bacterium had been spread either by aerosol or by direct contact with river water or debris.

An outbreak of Legionnaires' disease in 1965 in Washington, D.C., showed a third manner of exposure. Those who were downwind from sites where soil was being excavated were at greatest risk of pneumonia. It seemed probable that *L. pneumophila* was in the soil. Since that time, *L. pneumophila* has been isolated from soil at other sites; probably the organism lives in soil as well as in water.

Many questions about Legionnaires' disease remain. We do not know what makes some cooling towers and evaporative condensers dangerous and some not. A large minority of cooling towers contain *L. pneumophila;* clearly, not all cause outbreaks. We need to know more about the sources of sporadic cases of Legionnaires' disease. Perhaps the fact that persons who live near construction and excavation have higher attack rates than others means that dust raised during excavation carries *L. pneumophila,* but this has not been proved. Recently it was suggested that *L. pneumophila* lives in shower baths. One can readily imagine the ease with a person might be exposed to an aerosol of *L. pneumophila* while taking a shower, but whether disease is acquired this way has not been ascertained. We

also need to know why *L. pneumophila* causes Legionnaires' disease on some occasions and Pontiac fever on others.

In the last few months, some additions to the *Legionella* family have been identified. These *Legionella*-like organisms, as they have been called, resemble *L. pneumophila* in many ways. They grow on charcoal yeast extract agar, an agar developed to grow *L. pneumophila,* but not on most commonly available media. They contain large proportions of branched-chain fatty acids. They are fluorescent in long-wave ultraviolet light, which makes them relatively easy to recognize on agar media. At least some of them are genetically related to *L. pneumophila.* One of these organisms is *L. bozemanii* otherwise known as WIGA, MI-15, ALLO 1, and ALLO 2. One case of *L. bozemanii* pneumonia affected a scuba diver in the 1950s at a time when the scuba equipment was commonly contaminated with *Pseudomonas aeruginosa* and there was a large amount of respiratory illness among scuba divers. Another case of *L. bozemanii* pneumonia affected a man with chronic lymphocytic leukemia who fell out of his boat into a lake in South Carolina and later had pneumonia. Whether the organism had been acquired from water, as these anecdotes suggest, is not clear. These two cases and ten others diagnosed on the basis of serologic tests tended to be severe cases of pneumonia that became worse after the patients were hospitalized. Some suffered recurrences two to ten days after the use of antibiotics had been discontinued. It may turn out that this disease must be suspected by clinicians who see cases of community-acquired pneumonia, but accurate estimates of its incidence are lacking.

Another recently described agent is *L. micdadei,* otherwise known as *L. pittsburgensis,* the Pittsburgh pneumonia agent, TATLOCK, and HEBA. It is a gram-negative rod but is also partly acid fast. It will grow on eggs, in guinea pigs, and on charcoal yeast extract agar as *L. pneumophila* will. There is evidence that erythromycin may be helpful for patients with pneumonia caused by *L. micdadei,* as it is for those with Legionnaires' disease. Pneumonia caused, by *L. micdadei,* like that caused by *L. pneumophila,* affects mostly adults. It has been recognized almost exclusively as a nosocomial infection, primarily affecting renal transplant patients who have been receiving very high doses of corticosteroids. We do not know the incidence of disease caused by *L. micdadei,* the sources, or the mode of spread.

Other *Legionella*-like organisms will soon be described. Most of them are not known to cause illness in humans, but continued search for the agents of pneumonia of unkown cause may identify a role for these fastidious bacteria that have been overlooked until recently.

We have learned several lessons from the studies of legionellosis and the *Legionella*-like organisms. In a narrow view, it is clearly important for the clinician to work closely with the epidemiologist and the microbiologist. That cooperation has been fruitful just in the last few months in identifying these new

causes of pneumonia. But in the broader view, I think that we need to be alert to the changing ecology of infectious diseases as people change their environment; for many infectious (as well as non-infectious) diseases, these actions are leading to increases in the incidence of disease. The discoveries of legionellosis have shown that we should place some trust in our own observations and be skeptical of conventional wisdom.

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Annotated Bibliography of Paleopathology: 1970-1979 Part III, K-S

MICHAEL R. ZIMMERMAN

K

304. **Kaiser, G. and Kaiser, G.** 1978. Eine frühgeschichtliche Sarg-Geburt. *Beitr. Gerichtl. Med.* 36:197-201. (A prehistoric grave-birth.)

A prehistoric burial from eastern Slovakia revealed postmortem birth of a (presumably dead) infant due to increased intra-abdominal pressure because of putrefaction.

305. **Katzenberg, M. A.** 1976. An investigation of spinal disease in a Midwest aboriginal population. *Yearbook Phys. Anthropol.* 19:349-355.

Five individuals from a Port Ancient site in Ohio are noted to have vertebral column lesions. Tuberculosis is strongly suspected in one case and suggested in two others.

306. **Keith, K. D., Snow, C. C. and Snow, J. B., Jr.** 1971. A child's skeleton from Western Oklahoma. *Bull. Okla. Anthropol. Soc.* 20:115-131.

The skeleton of a four-year-old female was dated to ca. 900 A.D. Death is attributed to intracranial complications of chronic otitis media. A partially healed lesion of osteomyelitis was seen in the left humeral diaphysis.

307. **Kelley, M. A.** 1979a. A survey of joint disease at the Libben site, Ottawa County, Ohio. *Henry Ford Hosp. Med. J.* 27:64-67.

The Libben site is an ossuary, dated to ca. 800-1100 A.D., containing 1327 articulated skeletons. Degenerative joint disease, septic and tuberculous arthritis, four or five tumorous lesions, and several other disorders were diagnosed. The over-all disease pattern suggests a preagricultural society in which individuals died of acute disease and trauma.

308. **Kelley, M. A.** 1979b. Skeletal changes produced by aortic aneurisms. *Am. J. Phys. Anthropol.* 51:35-38.

The skeletal changes in four documented cases of syphilitic aneurism are presented. The importance of this diagnosis in ancient remains is emphasized. Discussions of differential diagnosis and types of aneurism are included.

309. **Kerley, E. R. and Johnson, L. C.** 1974. Report on pathological specimens from Mokapu (Appendix B.). In: *Early Hawaiians: An Initial Study of Skeletal Remains from Mokapu, Oahu,* ed. C.E. Snow, pp. 149-158. Lexington: Univ. Press of Kentucky.

Twelve pathologic specimens selected by Snow for more detailed study at the Armed Forces Institute of Pathology, Washington, D.C., are described and provisionally diagnosed. Possible evidence of vertebral tuberculosis, hydrocephalus, congenital clubfoot (talipes equinovarus), bone neoplasms, and leukemia is discussed.

310. **Kerley, E. R. and Ubelaker, D. H.** 1978. Revision in the microscopic method of estimating age at death in human cortical bone. *Am. J. Phys. Anthropol.* 49:545-546.

A systematic error, due to variations in microscopic structure, is noted in Kerley's 1965 method of estimating age at death. Correction factors are given.

311. **King, D. H.** 1979. Oconastota's grave: archeologists uncover the great warrior of Chota. *Early Man* Summer: 17-21.

Excavation of the grave of an eighteenth-century Cherokee Indian chief revealed that he had suffered from tuberculous osteomyelitis. The exact nature of the disease is not stated in this primarily historical article.

312. **Kiszely-Hanko, I.** 1974. A brief anthropological characterization of three artificially deformed skulls from Sweden. *Ossa* 1:38-40.

The skulls are from Gotland and date from 700-1000 A.D.

313. **Kleiss, E.** 1975. X-rays of the heads of Egyptian mummies. *Proc. 10th Int. Congr. Anat., Tokyo,* p. 535.

A report on nine heads from the Museum of Fine Arts in Vienna. One had a sutura frontalis, three had aplasia of the frontal sinuses, and in two others the sinuses were extremely small. Another had a possible hypophyseal tumor. Severe dental disease was present.

314. **Kleiss, E. and Simonsberger, P.** 1964. *La parafinizacion como método morfólogico.* Merida, Venezuela: Univ. de los Andes.

New methods of embalming will provide headaches for the paleopathologists of the future. Human brains have been impregnated with paraffin since 1874. It is possible that Lenin's body was processed by some wax method, and the finest example of the technique is said to be the body of Eva Peron. This paper gives a review of the history and techniques employed in this process.

315. **Klepinger, L. L.** 1979. Paleopathologic evidence for the evolution of rheumatoid arthritis. *Am. J. Phys. Anthropol.* 50:119-122.

A Sicilian skeleton of the third century B.C. shows changes suggestive of degenerative joint disease, spondylosis, rheumatoid arthritis, and ankylosing spondylitis. The author suggests that this skeleton represents a transition between the last two diseases, an evolution suggested by recent historical and epidemiologic studies. On the other hand, this hypothesis, based on the work of Short (1974), is not supported by tissue histocompatibility studies which show a genetic predisposition to ankylosing spondylitis which has no relation to rheumatoid arthritis. This case may be one of ankylosing hyperostosis of Forestier, and the diagnosis of rheumatoid arthritis must be considered speculative.

316. **Klepinger, L. L., Kuhn, J. K. and Thomas, J.** 1977. Prehistoric dental calculus gives evidence for coca in early coastal Ecuador. *Nature* 269:506-507.

Skulls from a cemetery on the Santa Elena Peninsula of Ecuador showed heavy accumulation of tartar (supragingival dental calculus). The site began about 840 B.C. and was occupied for many years. It is argued that this tartar resulted from the chewing of coca. This in turn suggests a prehistoric trade in coca, probably in exchange for mollusk shells.

317. **Kliks, M.** 1975. *Paleoepidemiological studies on Great Basin coprolites: estimation of dietary fiber intake and evaluation of the ingestion of antihelminthic plant substances.* Berkeley: Occ. paper, Arch. Res. Facil., Univ. of Calif., Berkeley.

A re-examination of previously separated material from 200 human coprolites and new studies of twenty additional specimens confirmed the presence of large quantities of seeds of two species of Chenopodiaceae and the absence of helminth ova. Gas-liquid chromatography of seed extracts revealed terpene fractions, the antihelminthic activity of which was not determined.

318. **Knowles, F. H. S.** 1937. *Physical Anthropology of the Roebuck Iroquois.* Ottawa: Natl. Mus. of Canada, Bull. 87.

This report mentions some pathological specimens from a late prehistoric Iroquois village. In the remains of 113 individuals there was evidence of fractures, inflammation, alveolodental lesions, osteoarthritis, ankylosis, spondylolysis, and a variety of unspecified bony swellings. The material is compared with that obtained from other sites in Ontario.

319. **Kuhnlein, H.V.** 1976. Strontium and lead in the Hopi nutritional environment and teeth. Ph.D. dissertation, Univ. of Calif., Berkeley.

Deciduous teeth from seventeenth-century and modern Hopi children were compared by X-ray fluorescence for strontium, lead, zinc, copper and mercury. The seventeenth-century teeth contained less lead, zinc and copper, equivalent small amounts of mercury, but four times as much strontium as the modern teeth. It was concluded that the high levels of strontium were due to geologic conditions and cultural practices which encouraged the use of strontium-rich culinary ash and harvested green plants. No ill effects of the strontium were demonstrated. The high modern levels of lead are related to the treatment of corn with lead-contaminated water and lead-containing machinery.

320. **Kuksis, A., Child, P., Myher, J. J., et al.** 1979. Bile acids of a 3200-year-old Egyptian mummy. *Can. J. Biochem.* 56:1141-1148.

The bile acids of an Egyptian mummy (Nakht-Rom I) were isolated by thin-layer chromatography and identified by combined gas-liquid chromatography and mass spectrometry. Although dehydration and bacterial breakdown had occurred, the bile acids were essentially identical to those of modern man. The conclusion is that the metabolic pathways of cholesterol 3,200 years ago were the same as in modern man.

321. **Kunitz, S. J.** 1970. Disease and death among the Anasazi: some notes on southwestern paleoepidemology. *El Palacio* 76:17-22.

It is suggested that during the Pueblo III period (1100-1300 A.D.) in the American southwest, environmental conditions worsened to such a degree that endemic diseases such as weanling diarrhea, in conjunction with increasing malnutrition, were important in the decline and virtual abandonment of the Anasazi area.

322. **Kunitz, S. and Euler, R. C.** 1972. *Aspects of southwestern paleoepidemiology.* Prescott, Ariz.: Prescott College Press.

In a series of hypotheses concerning the possible rate of disease in the population shifts of the prehistoric and early historic American southwest, the authors argue that ecologic changes wrought by the Anasazi also brought about changes in patterns of morbidity and mortality. These changes, and the questions they raise, could be investigated fruitfully from a paleopathologic viewpoint.

323. **Kuttner, R. E.** 1978. Prehistoric spina bifida occulta. *J.A.M.A.* 240:2631.

This letter refers to Bennett's (1972) finding of a high incidence of this lesion in proto-Modoc Indians. An isolated prehistoric Modoccan population is noted to show a similar incidence of this anomaly, which was not seen in remains from neighboring sites. Therefore, a genetic rather than an environmental basis is suggested.

L

324. **Labadie, E.** 1975. Neurological and medical afflications recorded by pre-Columbian Mexican craftsmen. *Ariz. Med.* 32:290-298.

Diseases represented in a number of stone sculptures and ceramic artefacts from Mesoamerica are described. The conditions are as follows: two examples of parturition; two sutured facial wounds; two third nerve palsies; a case of probable myasthenia gravis; a case of congenital scoliosis (kyphosis?), a case of hemiplegia; and an outstanding case of retro-orbital tumor with therapeutic craniotomy. The author contends that, at least in some of the cases, artists working under the direction of physicians were recording interesting cases for instructional purposes.

325. **Lallo, J. W.** 1973. The skeletal biology of three prehistoric American Indian societies from Dickson Mounds. Ph.D. dissertation, Univ. Mass.

This is a study of the changing ecological relationships of a population and of the impact on aspects of biological variability in that group. It is argued and demonstrated that an increased reliance on agriculture, an increase in population density and sedentarism, and an increase in the extent and intensity of trade networks will be reflected in the biological parameters of that population in the form of retardation of growth, decrease in sexual dimorphism, increase in mortality and increase in infectious disease. An effective use of life tables strengthens these contentions.

326. **Lallo, J. W. and Rose, J. C.** 1979. Patterns of stress, disease, and mortality in two prehistoric populations from North America. *J. Hum. Evol.* 8:323-335.

Periostitis and osteomyelitis in Dickson Mounds skeletons are used as indices of infection rates in the population; Wilson's bands in dentition were taken to reflect phenomena of stress. The authors present a successful test of the hypothesis that cultural-ecologic changes during the Transitional and Middle Mississippian cultures, with increasing dependence on maize agriculture, resulted in increased stress, and elevated rates of infection and mortality.

327. **Lamendin, H.** 1974. Observations with SEM of rehydrated mummy teeth. *J. Hum. Evol.* 3:271-274.

Teeth from naturally dried mummies of the general population of Egypt from ca. 3500 B.C. were felt to give a normal appearance after rehydration. The scanning electron microscopy of the teeth is described. An attempt to estimate age at death from the specimens proved rather unsatisfactory.

328. **Lang, E. F.** 1975. Bones and beyond. *Am. J. Roentgenol.* 124:154-156.

The deductive approach to the radiology of skeletal lesions is demonstrated by means of archeologic examples, such as inferences drawn from different patterns of forearm and ankle fractures in ancient European and Egyptian populations. The modern radiologist is urged to use the same approach.

329. **Laughlin, W. S.** n.d. The use and abuse of mummies. Storrs, Conn. Unpubl. manuscript, Univ. of Connecticut.

A discussion of the rationale and techniques of Aleut mummification. The mummies are found in caves, and were used as oracles as late as 1862. Aleut anatomic knowledge is considered as a factor in their practices of mummification and dismemberment.

330. **Laughlin, W. S., Harper, A. B. and Thompson, D. D.** 1979. New approaches to the pre- and post-contact history of Arctic peoples. *Am. J. Phys. Anthropol.* 51:579-588.

Osteon-photon analysis of bone cores from skeletal remains allows determination of age at death. Calculations of life expectancy are then correlated with pathologic changes in an effort to clarify the relative longevity of pre- and post-contact Eskimo and Aleut populations.

331. **Lavelle, C. L.** 1973. Alveolar bone loss and tooth attrition in skulls from different population samples. *J. Periodont. Res.* 8:395-399.

Skulls of 614 individuals, including Romano-British up to nineteenth-century British caucasoids, were examined for evidence of periodontal disease and dental attrition. It was found that both processes were much less severe in the more modern skulls. The difference is attributed to softer modern diets.

332. **Lee, S. L. and Stenn, F. F.** 1978. Characterization of mummy bone ochronotic pigment. *J.A.M.A.* 240:135-138.

Alkaptonuria is discussed. The connective tissue of such patients accumulates a grey to black pigment, a condition termed ochronosis by Virchow in 1866. A case, verified by biochemical analysis, is reported in an Egyptian mummy.

333. **Leek, F. F.** 1966. Observations on the dental pathology seen in ancient Egyptian skulls. *J. Egypt. Archeol.* 52:59-64.

A survey of late dynastic skulls revealed all the dental diseases to which modern man is prey. Attrition and periodontal disease were predominant, rather than the caries seen in modern dentitions. There was no evidence of intervention by dental practitioners.

334. **Leek, F. F.** 1971. A technique for the oral examination of a mummy. *J. Egypt. Archeol.* 57:105-109.

A technique is presented in which a radioactive source is placed within the oral cavity and film placed on the outside, producing a panoramic view of the dentition.

335. **Leek, F. F.** 1972. Teeth and bread in ancient Egypt. *J. Egypt. Archeol.* 58:126-132.

Radiologic and mineralogic analysis of samples of ancient Egyptian bread revealed many particles of grit and stone. These account for the severe dental attrition seen in many ancient skulls.

336. **Leisen, J. C. and Duncan, H.** 1979. The impact of rheumatic disease on society. *Henry Ford Hosp. Med. J.* 27:70-73.

The ubiquity of degenerative changes in the joints makes it difficult to evaluate these changes in relation to disability in modern society. It is pointed out that this *caveat* applies equally to ancient remains and ancient societies.

337. **Lengyl, I. A.** 1975. *Paleoserology: blood typing with the fluorescent antibody method.* Budapest: Akad. Kiado.

The technique of fluorescent antibody blood grouping is validated by application to a sample of modern bone specimens of known type. The technique was then applied to central European skeletal remains, ranging from medieval to Mesolithic, in an effort to clarify population movements. Despite some editorial weaknesses, this book is of value to the worker in paleoserology. It is probably of only casual interest to the general reader in paleopathology.

338. **Lewin, P.K.** 1967. Paleo-electron microscopy of mummified tissue. *Nature* 213:416-417.

Electron microscopic sections of Egyptian mummy tissues showed preservation of nuclear membranes, mitochondria, skeletal muscle and possibly of red blood cells. The possibility of demonstrating infectious agents is discussed.

339. **Lewin, P. K.** 1968. The ultrastructure of mummified skin cells. *Can. Med. Assoc. J.* 98:1011-1012.

Skin from a mummified Egyptian hand was examined with the electron microscope. Many of the greatly shrunken cells were intact and some cellular components were recognizable.

340. **Lewin, P. K.** 1977. Mummies that I have known. *Am. J. Dis. Child.* 131:349-350.

A review of the use of the electron microscope in paleopathology and of the autopsy findings in several Egyptian mummies examined by the Paleopathology Association.

341. **Lewin, P. K. and Cutz, E.** 1976. Electron microscopy of ancient Egyptian skin. *Br. J. Dermatol.* 94:573-576.

Electron microscopy of skin from the sole of a 14-year-old Egyptian who died 3,200 years ago (ROM-I) revealed remarkable preservation of epidermal cells and their ultrastructural components.

342. **Lewin, P. K., Mills, A. J., Savage, H. et al.** 1974. Nakht: a weaver of Thebes. *Rotunda (J. R. Ont. Mus.)* 7:14-17.

The archeologic and paleopathologic information gained from the examination of a 3200-year-old mummy is presented. Death was attributed to schistosomal cirrhosis and there was evidence of tapeworm and anthracosis. The funerary clothes were well preserved. Plans for restoration for display are discussed.

343. **Little, K.** 1960. The matrix in old and osteoporotic bone. *Proc. Eur. Reg. Conf. Elect. Micros.* 2:791.

Electron microscopy and X-ray diffraction are used to compare collagen in recent and 1800-year-old bone, before and after fixation.

344. **Llagostera, E.** 1978. *Estudio radiológico de las momias egipcias del Museo Arqueológico Nacional de Madrid.* Madrid: Mus. Arqueol. Nac. (Radiographic studies of the Egyptian mummies in the National Archeological Museum, Madrid.)

This lavishly produced volume, complete with color plates, shows both human and animal mummies in the museum. In some cases there is opacity of the intervertebral discs as well as spondylitis.

345. **Lock, S.,** ed. 1975. Obstetric traces. *Br. Med. J.* 2:665.

A very brief discussion on determination of fecundity in paleopathology, based on changes in the pubic bone. According to Houghton, changes of the iliac preauricular groove are the only conclusive skeletal evidences of parturition, but the editor thinks that this needs to be confirmed. Estimations of fecundity are complicated by the nature of the labor and delivery, as shown by studies of women with obstetric vesico-vaginal fistulae. The studies of Angel and Wells are mentioned.

346. **Lovejoy, C. O., Meindl, R. S., Pryzbeck, T. R. et al.** 1977. Paleodemography of the Libben Site, Ottawa County, Ohio. *Science* 198:291-293.

An Amerindian site dated to A.D. 800-1100 was completely excavated and yielded 1,327 skeletons. Age, sex and survivorship data indicate low infant mortality, a twenty year life expectancy, and mortality higher in males than in females. These results are in contrast to those seen in modern aboriginal populations. It is suggested that contact with pathogens of developed societies is responsible for high infant mortality in modern aborigines, i.e., that contact is a selective force which may have played a role in human evolution.

347. **Lucas, A. and Harris, J. R.** 1962. Mummification. In: *Ancient Egyptian Materials and Industries,* pp. 270-326. London: Arnold.

This chapter presents a detailed and extensive account of the historical and technical aspects of Egyptian mummification. The primary focus is on the materials used.

348. **Lynn, G. E. and Benitez, J. T.** 1974. Temporal bone preservation in a 2000-year-old Egyptian mummy. *Science* 183:200-202.

The oldest known perforation of the eardrum is presented, along with an insect larva (Staphylinidae, probably genus *Atheta)* preserved by the resin near the eardrum. The person had almost certainly suffered from acute otitis media and a degree of deafness.

M

349. **McCaffery, M.** 1974. Autopsy of a mummy — warts and all. *Can. Fam. Phys.* 20:89-91.

This report describes the autopsy of mummy ROM-I in August, 1974. See Hart et al., 1977.

350. **McGrew, R. N. and Gregg, J. B.** 1971. Anomalous fusion of the malleus to the tympanic ring. *Ann. Otol. Rhinol. Laryngol.* 80:138-140.

An anomalous development of the middle ear is reported in the skull of a Sioux Indian child from the Smithsonian collection. A date for the specimen is not given. The high incidence of anomalies of this anatomic region in modern Sioux is noted.

351. **McHargue, G.** 1972. *Mummies.* Philadelphia: Lippincott.

A book apparently written for schoolchildren. It presents a good summary of facts about mummies from many areas of the world.

352. **McHenry, H. M. and Schultz, P.D.** 1976. The association between Harris lines and enamel hypoplasia in prehistoric California Indians. *Am. J. Phys. Anthropol.* 44:507-512.

In studies based on femora and canine teeth of young adults no statistically significant association was found between enamel hypoplasia and Harris lines in the long bones for the first six years of life in a large series (n = 147) of prehistoric California Indians. This finding was ascribed to differences in etiology and stability. It is suggested that lines of hypoplasia in the enamel are the result of trauma only, while the formation of Harris lines is attributed to trauma followed by quick recovery. Trauma is used in the sense of disease, malnutrition, or other metabolic insults.

353. **MacCurdy, C. G.** 1970. Surgery among the ancient Peruvians. *Art. Archeol.* 7:381-394.

Abstract unavailable.

354. **Mackie, A., Townshend, A. and Waldron, H.A.** 1975. Lead concentrations in bones from Roman York. *J. Archeol. Sci.* 2:235-237.

Rib fragments from seventy-seven burials from the Romano-British cemetery at Trentholme Drive, York, were analyzed for lead by atomic absorption spectroscopy. The results indicate a slightly higher burden of lead in the early population of York compared to the contemporary population.

355. **Majno, Guido.** 1975. *The healing hand: man and wound in the ancient world.* Cambridge: Harvard Univ. Press.

This is an exceptional work, which contains a full discussion of man, his wounds, and their care in the ancient world. It includes discussions of prehistory, archeology, history, philosophy, experimental pathology, paleopathology, and much more. The ten chapters cover the topics of prehistory, Mesopotamia, Egypt, Greece, Arabia, China, India, Alexandria, Rome and Galen. Extensive documentation and a large bibliography make this a valuable reference. Unfortunately, there is an error in the frontispiece, in that the arrowhead shown is piercing the sternum from front to rear rather than the stated reverse. The book is deliberately made elementary, so that the totally uninitiated can understand it, but the treatment is rather too elementary for the specialist.

356. **Mallin, R. and Rathbun, T. A.** 1976. A trephined skull from Iran. *Bull. N.Y. Acad. Med.* 52:782-787.

The fragmentary cranium of an 11 or 12-year-old child from Dinkha Tepe, N.W. Iran, is described. Although their list of diagnoses is limited, the authors feel that trephination is most likely. The patient probably survived the operation, but a reason for the operation could not be determined. The differential diagnosis, including an enlarged parietal foramen, is discussed.

357. **Manchester, K.** 1977. Carved human bone from the Roman *vicus,* Castleford. *Yorks. Archeol. J.* 49:37-38.

Skeletal remains of a middle-aged male of uncertain dating showed evidence of postmortem carving. The tibia was worked into what appeared to be an awl.

358. **Manchester, K.** 1978. Paleopathology of a Royalist garrison. *Ossa* 5:25-33.

The pathologic features of nine male skeletons from Sandal Castle in Yorkshire are described. From archeological considerations the skeletons are considered to be those of the military garrison of King Charles I during the Civil War (1645). Congenital, traumatic, degenerative, and infectious abnormalities are described and their conjectured clinical effects discussed.

359. **Manialawi, M., Meligy, R. and Bucaille, M.** 1978. Endoscopic examination of Egyptian mummies. *Endoscopy* 10:191-194.

The use of the endoscope in non-destructive studies of mummies is described. Some good photographs are presented, including the broken cribriform plate of Ramses V. The mummies studied were those of Pharaohs Merneptah (through a hole in the chest wall), Ramses V (through a defect in the left parietal bone), and Ramses II (through the embalmers' incisions).

360. **Marchiafava, V.** 1972. Studio istologico del margine del foro frontale della calotta cranica di "Taulera." *Boll. Soc. Sarda. Sc. Natl.* 8:65. (Histological investigation of the edge of the frontal hole in the "Taulera" skull.)

Abstract unavailable.

361. **Marchiafava, V., Bonucci, E. and Ascanzi, A.** 1974. Fungal osteoclasia: a model of dead bone resorption. *Calcif. Tissue Res.* 14:195-210.

The histologic and ultrastructural features of post mortem bone destruction by fungus are presented. The mechanism is proposed to be solubilizing and decalcification of the bone matrix.

362. **Martin, D. L. and Armelagos, G. J.** 1979. Morphometrics of compact bone: an example from Sudanese Nubia. *Am. J. Phys. Anthropol.* 51:571-578.

Microradiographic and histologic studies of bone from fourth-sixth century A.D. Nubia revealed osteoporosis to be much more common in adult females than in males. The difference is attributed to the stresses of childbearing and childrearing. The value of these techniques for the study of extinct and extant populations is stressed.

363. **Martin, D. L., Armelagos, G. J. and King, J. R.** 1979. Degenerative joint disease of the long bones in Dickson Mounds. *Henry Ford Hosp. Med. J.* 27:60-63.

Variation in patterns of degenerative joint disease were seen in the three cultural groups represented in the Dickson Mounds, Illinois. These groups covered a period from 1050 to 1300 A.D., transitional from hunting-gathering to maize agriculture. Quantitative studies are planned in an effort to delineate the interplay among cultural and ecological variables and disease.

364. **Martin, R. A.** 1969. *Mummies.* Chicago: Field Museum Press.

This pamphlet gives a brief but well illustrated discussion of Egyptian rituals and techniques of mummification.

365. **Massa, E. R.** 1969a. Studio mediante il "tricocicloforo" dei capelli di Egiziani antichi e rilevanza a fini etnici. *Riv. Antropol.* 54:261-266.

The "tricocicloforo" method used on hair of Egyptian mummies. The hair of early mummies is classified as kimotrichous.

366. **Massa, E. R.** 1969b. Sezioni istologiche dei capelli de Egiziani. *Riv. Antropol.* 56:276-278.

Classification of hair type of Egyptian mummies based on histology.

367. **Massa, E. R., Chiarelli, B., Sacerdote, M. et al.** 1967. Presenza di globuli rossi nei tessuti di mummi egiziane. *Boll. Soc. Ital. Biol. Sper.* 43:1333-1334.

Preservation of red blood cells in an Egyptian mummy. This finding has since been disputed and the objects in question are considered to be fungal spores.

368. **Massa, E. R., Sacerdote, M., Repetti, P. et al.** 1967. Dati istologici sulla conservazione della cartilagine auricolare di mummie egiziane. *Boll. Soc. Ital. Biol. Sper.* 43:1332-1333.

Histologic demonstration of the preservation of cartilage in the ear of an Egyptian mummy.

369. **Masters, P. M. and Zimmerman, M. R.** 1978. Age determination of an Alaskan mummy: morphological and biochemical correlation. *Science* 201:811-812.

An interdisciplinary examination of an Alaskan mummy demonstrates the value of preserving rare specimens. In 1973, morphologic findings in this 1400-year-old body suggested an age at death between fifty and sixty years. In 1977, analysis of aspartic acid racemization in a tooth indicated an age at death of 53 ± 5 years. The authors explain the analytic technique and propose applications to gerontology and wildlife biology.

370. **Mensforth, R. P., Lovejoy, C. O., Lallo, J. W. et al.** 1978. The role of constitutional factors, diet, and infectious disease in the etiology of porotic hyperostosis and periosteal reactions in prehistoric infants and children. *Med. Anthropol.* 2, No. 1, pt. 1:1-59.

A detailed study of human remains from the Libben Site, a Late Woodland site in Ohio, demonstrates the pattern of lesions to fit with iron-deficiency anemia as a manifestation of nutritional stress and infectious disease. Paleoepidemiologic analysis points out the high mortality associated with the lesions. The potential errors of this type of study are noted. The bibliography is extensive.

371. **Metress, J. F. and Conway, T.** 1974. A guide to the literature on the dental anthropology of post-Pleistocene man. *Tol. Abor. Res. Club Bull.* Suppl. Monogr. No. 1.

This extensive categorized bibliography of dental anthropology includes a few items of interest to the paleopathologist: dental mutilation, attrition, hypoplasia, hypo- and hyperdontia and dental pathology including caries.

372. **Micle, S., Kobilyansky, E., Nathan, M. et al.** 1977. ABO-typing of ancient skeletons from Israel. *Am. J. Phys. Anthropol.* 47:89-92.

Skeletons from Israel of the first and fourth century A.D. showed high A and B and low frequency of O. The difference from modern populations is discussed.

373. **Mignot, J., Ceccaldi, P.-F., Durigon, M. et al.** 1976. Etude histopathologique de la peau d'une momie. *Arch. Anat. Cytol. Pathol.* 24:291-294. (Histopathologic study of the skin of a mummy.)

This study of skin from a 3000-year-old mummy describes the techniques used. Some good photographs are included.

374. **Miles, J. S.** 1975. *Orthopedic problems of the Wetherill Mesa populations.* Washington, D.C.: National Park Service.

179 complete and 366 fragmentary burials from Mesa Verde National Park, Colorado, were examined for evidence of bone disease, as reported in this thorough, cautious, and well illustrated monograph. Statistics and archeologic correlation are lacking, but there is an excellent commentary on each disease found. (U.S.G.P.O. No. 024-005-00553-6, $1.75.) An excellent glossary and index complete the work.

375. **Mohlin, B., Gagne, S. and Thilander, B.** 1978. The frequency of malocclusion and the craniofacial morphology in a medieval population in southern Sweden. *Ossa* 5:57-84.

Dental and occlusal anomalies were observed in medieval skulls. The authors used the criteria that were employed in recent Scandinavian epidemiologic orthodontic studies. Impaction of canine teeth, tipping, rotation, crowding, and spacing were seen; but extreme changes, such as would require orthodontic treatment in a modern population, were uncommon. Anatomic and functional differences from modern populations are discussed.

376. **Møller-Christensen, V.** 1973. Osteo-archeology as a medico-historical auxiliary science. *Med. Hist.* 17:411-418.

A plea is made for more complete and careful excavation of entire skeletons, including the preparation of an "autopsy table" by trenching around the skeleton. A case of echinococcosis in a leper is presented.

377. **Molnar, S.** 1972. Tooth wear and culture: a survey of tooth functions among some prehistoric peoples. *Curr. Anthropol.* 13:511-526.

Patterns of dental attrition in fossil hominids and the remains of more recent primitive humans are analyzed in terms of diet and tool functions of the teeth. Specific patterns of dental wear can supply important information about past populations. Comments are included.

378. **Moore, J. G., Grundmann, A. V., Hall, H. J. et al.** 1974. Human fluke infection in Glen Canyon at A.D. 1250. *Am. J. Phys. Anthropol.* 41:115-117.

A fluke egg, of unknown genus and species, was found in a coprolite, probably of human origin, in a site of prehistoric habitation.

379. **Moore, J. G., Fry, G. F., and Englert, E., Jr.** 1969. Thorny-headed worm infection in North American prehistoric man. *Science* 163:1324-1325.

Examination of coprolites, probably of human origin, from a pre-Columbian site at Danger Cave, Utah, revealed acanthocephalan ova in four of twenty-six specimens. *Moniliformis clarki* is the suggested identification. The pathology and probable mode of acquisition of this infection are described briefly.

380. **Moore, W. J. and Corbett, M. E.** 1971. The distribution of dental caries in ancient British populations. 1. Anglo-Saxon period. *Caries Res.* 5:151-168.

Caries was seen most commonly at the cemento-enamel junctions in 504 Anglo-Saxon dentitions, and rarely at contact areas. This pattern is attributed to the lack of sugar in the Anglo-Saxon diet. It is suggested that caries in this population is due to attrition and food packing at the gingival margin.

381. **Moore, W. J. and Corbett, M. E.** 1973. The distribution of dental caries in ancient British populations. 2. *Caries Res.* 7:139-153.

The distribution of caries in Iron Age, Romano-British, and medieval dentitions was found to be unchanged from that seen in a study made by the same investigators in 1971. A slight increase in contact area caries was noted in medieval specimens.

382. **Moore, W. J. and Corbett, M. E.** 1975. Distribution of dental caries in ancient British populations. 3. The seventeenth century. *Caries Res.* 9:163-175.

Caries was found to be more common in the dentitions of the victims of the Great Plague of London (1665) than in specimens from earlier periods. The over-all pattern was found to be similar to that seen in modern British populations, caries being most frequent at contact areas. The changes correlate well with changes in diet between the late Middle ages and the seventeenth century, specifically an increase in consumption of refined carbohydrate.

383. **Morse, D.** 1967. Two cases of possible treponemal infection in prehistoric America. See Wade, 1967, pp. 48-60.

Two skeletons from Mississippian horizons in Illinois were examined grossly, microscopically, and radiologically. Both showed a diffuse inflammatory disease with alternating areas of involved and normal bone. There was little or no involvement of epiphyses or joints. Both showed osteitis of the outer table of the frontal bone; one showed extensive destruction of the face. The author suggests that these represent possible treponemal infection, either yaws or syphilis.

384. **Morse, D.** 1969. *Ancient disease in the Midwest.* Springfield: Illinois State Mus.

This monograph is of value for the presentation of basic information on skeletal pathology and paleopathology. Thirty-six plates amply demonstrate the gross and radiologic appearance of most of the major lesions of the skeletons.

385. **Morse, D.** 1973. *Modena: An Account of 75 Years of Archeological Investigation in Southeast Mississippi County, Arkansas.* Fayetteville: Univ. of Arkansas Mus.

Several pathologic findings are noted in a total of 1,755 skeletons. These include a healed infection of the frontal bone, a possible scalping with survival, two button osteomas, a possible nasal carcinoma, osteosclerosis, and various dental abnormalities.

386. **Morse, D., Brothwell, D. R. and Ucko, P. J.** 1964. Tuberculosis in ancient Egypt. *Am. Rev. Respir. Dis.* 90:524-541.

The evidence for tuberculosis in ancient Egypt is reviewed, covering evidence from literature, art, and anatomic specimens. It is noted that there are no descriptions of the disease in the Egyptian medical papyri. A bibliography is included.

387. **Morse, D., Crusoe, D., and Smith, H. G.** 1976. Forensic archeology. *J. Forensic Sci.* 21:323-332.

A plea for the use of trained personnel in the excavation of buried bodies. An account of two mass burials is given. One was obtained at Cummins Prison Farm, Arkansas; the other resulted from the Texas homosexual murders (1973). In both instances the bodies were exhumed by untrained staff. In the United States many skeletons unearthed and reported to police are those of Indians. The techniques to be followed in such cases are discussed, including determination of age at death, time of burial, and race.

388. **Morse, D., Dailey, R. C. and Bunn, J.** 1974. Prehistoric multiple myeloma. *Bull. N.Y. Acad. Med.* 50:447-458.

Four cases of possible multiple myeloma were diagnosed in many thousands of bones and bone fragments excavated from various mounds in Florida; dates are between 500 and 1300 A.D.

389. **Mouchacca, J.** 1977. Les champignons de la momie de Ramses II. *C.R. Acad. (Paris)* 285:515-517. (The fungi of the mummy of Ramses II.)

Analysis of the mummy wrappings, body, and coffin of Ramses II disclosed more than eighty fungal species. The action of these fungi, particularly in holding water, was responsible for much of the degradation of the mummy.

390. **Mouchacca, J.** 1978. Eléments biodétériogènes de la momie de Ramses II. *Bull. Soc. Mycol. Med.* 7:5-10. (Biodeteriorating elements in the mummy of Ramses II.)

Direct examination and microbiological analyses confirm the biodegradation of the mummy of Ramses II. Foci of recent infection and a dense fungal population of more than eighty species were observed.

391. **Mukhtar, G., Riad, H. and Iskander, Z.** 1973. *Mummification in Ancient Egypt.* Cairo: Cairo Museum (Egyptian Antiquities Organization).

This work celebrates the 100th anniversary of the discovery of the Royal mummies in the Valley of the Kings at Thebes. The main article, by Iskander, presents a brief account of mummification, and states that ducks mummified thirty-three years earlier by the late Proí. A. Lucas were still in good condition in spite of having been kept at room temperature and humidity.

392. **Munizaga, J., Allison, M. J. and Aspillaga, E.** 1978. Diaphragmatic hernia associated with strangulation of the small bowel in an Atacamena mummy. *Am. J. Phys. Anthropol.* 48:17-20.

Autopsy of a Chilean mummy from the third century A.D. revealed death to be due to a strangulated diaphragmatic hernia. The defect was probably congenital.

393. **Munizaga, J., Allison, M. J., Gerszten, E. et al.** 1975. Pneumoconiosis in Chilean miners of the sixteenth century. *Bull. N.Y. Acad. Med.* 51:1281-1293.

The conditions in the mines in greater Peru were appallingly bad. Many deaths are attributed to pneumoconiosis. Autopsies of twenty-two miners confirm this diagnosis. Twelve miners had extensive pneumoconiosis and silicosis, with extensive fibrosis. Pneumonia was found in nine cases and alveolar proteinosis in five cases.

394. **Munizaga, J., Allison, M. J. and Paredes, C.** 1978. Cholelithiasis and cholecystitis in pre-Columbian Chileans. *Am. J. Phys. Anthropol.* 48:209-212.

Two cases of gallbladder disease in Chilean mummies are presented. Gallbladder disease is noted to be generally common in modern American Indians, but no cases have been diagnosed in Peruvian mummies. The possibility of an environmental or dietary factor to account for this distribution is discussed.

395. **Murrill, R. I.** 1968. *Cranial and postcranial skeletal remains from Easter Island.* Minneapolis: Univ. of Minnesota Press.

Skeletal remains of eight of thirty-three individuals excavated on Easter Island during the Norwegian Archeological expedition to Polynesia in 1955-56 showed some examples of disease, most commonly arthritis. The time span of the remains is 1100-1868 A.D.

N

396. **Nansen, P. and Jørgensen, R. J.** 1977. Fund af parasitaeg i arkaeologisk materiale fra det vikingetidige Ribe. *Nord. Vet.* 29:263-266. (Parasite eggs identified in material from archeological excavations in Ribethe Viking age.)

Ova of *Fasciola hepatica, Ascaris* sp., *Taenia* sp., and *Trichuris* sp. have been demonstrated in archeological excavations from the early Viking period (ca. 800 A.D.) in Ribe, the oldest urban society of Denmark. The origin of the fecal material is discussed and there are excellent color photos of the ova.

397. **Nemeckova, A.** 1977. Histology of Egyptian mummified tissues from Czechoslovak collections. *Z. Aegypt. Spr. u. Alt.* 104:142-144.

Partial preservation of skin, tendon and brain is demonstrated. No pathologic changes were seen.

398. **Newell, R. R., Constandse-Westermann, T. S. and Meiklejohn, C.** 1979. The skeletal remains of Mesolithic man in western Europe: an evaluative catalogue. *J. Hum. Evol.* 8:1-228.

This catalog is an important contribution for those interested in Mesolithic paleopathology. An exhaustive and detailed listing of dating and provenience (often by consultation with the excavators) permits the reader to judge reliability and has resulted in reclassification of several specimens as non-Mesolithic. For each skeletal entry, the number of bones, their identification, condition of preservation, age, sex, current location, and number of persons is listed. Lesions include those of arthritis, fracture, osteomyelitis, embedded bone weapon points, caries, and porotic hyperostosis.

399. **Newman, M. T.** 1976. Aboriginal New World epidemiology, medical care and the impact of Old World disease imports. *Am. J. Phys. Anthropol.* 45:667-672.

Evidence is presented that pre-Columbian Americans were not relatively free from disease, as some have suggested, but had their own strains of infectious diseases, including treponematoses, bacillary and amebic dysentery, respiratory diseases, leishmaniasis, and trypanosomiasis. Native treatments were probably effective, at least symptomatically if not therapeutically, for many diseases and injuries, but could not cope with the "crowd-type" diseases introduced by Europeans.

400. **Nickens, P. R.** 1975. Prehistoric cannibalism in the Mancos Canyon, southwestern Colorado. *Kiva* 40:283-293.

The remains of thirty-three individuals showed evidence of cannibalism, including spiral splintering of all the long bones, butchering or cut marks on several bone fragments, differential burning of bones, absence of certain bones, and bleaching (probably due to burial after stripping off the muscle). These evidences make a good case for cannibalism in this prehistoric site.

O

401. **Ober, W. D.** 1979. Weighing the heart against the feather of truth. *Bull. N.Y. Acad. Med.* 55:636-651.

The history of funerary customs regarding the heart is reviewed. The cult of Osiris and the Book of the Dead are covered in detail, including some information on embalming techniques used for the heart and kidneys.

402. **Ortner, D. J.** 1976. The paleopathology program at the Smithsonian Institution: purposes and present status. *Bull. N.Y. Acad. Med.* 52:1197-1206.

The program features research on the skeletal manifestations of disease and the development of a registry of documented comparative material for use in compiling a registry of paleopathology. These registries contain records of gross specimens, photos, X-rays and references. The material is available to scholars and their cooperation is solicited.

403. **Ortner, D. J.** 1979. Disease and mortality in the early Bronze Age people of Bab edh-Dhra, Jordan. *Am. J. Phys. Anthropol.* 51:589-598.

The skeletons of ninety-two individuals showed evidence of trauma, tuberculosis, osteomyelitis, osteoporosis, and congenital anomalies. The important point is made that those who had little resistance to infection would probably have died with normal skeletons.

404. **Otten, C. M. and Flory, L. L.** 1963. Blood typing of Chilean mummy tissue: a new approach. *Am. J. Phys. Anthropol.* 21:283-285.

Seven Chilean and Peruvian mummies were determined to be of type O. The techniques and pitfalls of the blood grouping procedures are described.

405. **Over, H. J. and Jansen, J., Jr.** 1962. Het voorkomen van fascioloasis rond het begin van onze jaartelling in de omgeving van de 'Feddersen Wierde.' *Tijdschr. Diergeneeskd.* 87:1440-1441. (The finding of fascioliasis in the Feddersen Wierde refuse mound from the beginning of our era.)

Analysis of material from a 1,800-2,000-year-old refuse mound in northwestern Germany revealed ova of *Fasciola hepatica* and *Galba trunculata* shells.

406. **Owsley, D. W. and Bass, W. M.** 1979. A demographic analysis of skeletons from the Larson site (39 WW2) Walworth County, South Dakota: vital statistics. *Am. J. Phys. Anthropol.* 51:145-154.

A paleodemographic study of an American Indian (Arikara) town site and cemetery dated to ca. 1750-1785 A.D. Paleopathologic findings were related to childbearing, episodic starvation following crop failure, infectious disease such as tuberculosis, and intertribal warfare. The high death rate is consistent with the rapid postcontact decline of the Arikara.

P

407. **Paddock, F. K., Loomis, C. C. and Perkons, A. K.** 1970. An inquest on the death of Charles Francis Hall. *N. Engl. J. Med.* 282:784-786.

Hall was an Arctic explorer who died and was buried in Greenland in 1871. Examination of the frozen body revealed poor preservation of the tissues, but significant levels of arsenic were detected consistent with historical records of Hall's terminal illness. Poisoning by his ship's company is suggested.

408. **Perrot, R.** 1971. Étude anthropologique de vestiges humains provenant de deux puits gallo-romains (Tournus, Sâone et Loire). *Docum. Las. Geol. Fac. Sci. Lyon* 45:131-143. (Anthropologic study of human remains from two Gallo-Roman wells.)

Each of these wells contained a male skeleton. One skull showed a partial trephination with some healing. This is the only known case from this period.

409. **Perrot, R.** 1972. Compte-rendu d'activit es ánnuelles: 1972. Association Régionale pour le dévelopment des recherches de Paléontologie et de Préhistoire et des Amis du Museum. Départment des Sciences de la Terre, 15-43 Blvd. du 11 novembre 1918, 69621 Villeurbanne. (Report of annual activities for 1972.)

Photographs of numerous bone lesions include those found in a man from Givars (fifteenth-sixteenth century) about twenty-five to thirty years of age, with ankylosing spondylitis of the lower lumbar vertebra and sacrum.

410. Perrot, R. 1973. Une sépulture double Mérovingienne a Seyssinet-Pariset (Isère). *L'Anthrop.* 77:545-578. (A double burial from Merovingian times in Seyssinet-Pariset.)

A full anthropologic study reports arthritis of the temporomandibular joints and spina bifida in a male; the female showed sacralization of L5 and scoliosis.

411. Perrot, R., Wells, C. and Juillard, J. 1977. Les deux sépultres médiévales du Chateau de Saint-Loup (Boyer 71). *Trav. Doc. Centre Paleoanthrop. Paleopath.* 4:149-165. (Two medieval burials from Chateau de Saint-Loup.)

The first burial is that of a man with Schmorl's nodes of the L2 to S1 vertebrae. The other man showed a well healed fracture of the distal third of the left ulna, extensive dental disease, and an osteoma of the ethmoid bone.

412. Persson, O. 1976-71. A trepanned skull from the Gillhög passage-grave at Barsebäck in West Scania (Southern Sweden). *Ossa* 3/4:53-61.

A large trephination in a forty to fifty-year-old early Neolithic male is described. There is some evidence of healing. Reasons for trephination are discussed, but none is suggested for this case.

413. Perzigian, A. J. 1972. Bone growth in two prehistoric Indian populations. *Proc. Indiana Acad. Sci.* 81:58-64.

Two prehistoric American Indian populations, Indian Knoll and Pete Klunk Mound Group, were studied. Significant inner- and intrapopulation differences in the diameter of the radius were shown. Males of both populations were larger than females, and Pete Klunk Indians were larger than those of Indian Knoll, male and female. These differences are attributed to dietary factors, the Pete Klunk (Hopewell) diet being considered the more nutritious.

414. Perzigian, A. J. 1973a. Osteoporotic bone loss in two prehistoric Indian populations. *Am. J. Phys. Anthropol.* 39:87-96.

Photon absorptiometry, measuring bone mineral mass, was used to examine the demineralizing effects of aging on human bone. Rates and amounts of demineralization were compared in two Amerind populations, Indian Knoll (2500 B.C.-2000 B.C., Archaic Period), a hunting and gathering group, and Pete Klunk (50 B.C.-250 A.D., Middle Woodland or Hopewell Period), hunter-gatherers with some agriculture. The latter was felt to have a more nutritionally adequate and reliable diet. It was shown that, as in modern populations, trabecular and female rates of loss were greater, respectively, than cortical and male rates. Hopewell Indians lost bone at a faster rate than Indian Knoll people, who had an amount of loss similar to that in modern populations. It is suggested that dietary sufficiency does not contribute significantly to skeletal maintenance during aging and that genetic factors play a large role.

415. Perzigian, A. J. 1973b. The antiquity of age-associated bone demineralization in man. *J. Am. Geriatr. Soc.* 21:100-105.

Rates of osteoporosis in skeletons from the Indian Knoll site (2500-200 B.C.) were measured by photon absorptiometry. Women were found to lose minerals earlier and faster, a phenomenon that is still present, despite great cultural and dietary differences. Bone loss with age is believed to have a large genetic component.

416. **Perzigian, A. J. and Widmer, L.** 1979. Evidence for tuberculosis in a prehistoric population. *J.A.M.A.* 214:2643-2646.

Lesions in six skeletons of late prehistoric American Indians (ca. 1275 A.D.) are diagnosed as tuberculous. Radiographs and detailed descriptions are presented and the differential diagnosis is discussed. The authors emphasize transmission of crowd facilitated diseases such as tuberculosis by the change from hunting-gathering to sedentary agriculture.

417. **Phenice, T. W.** 1969. *An analysis of the human skeletal material from burial mounds in north central Kansas.* Lawrence, Kansas: Univ. of Kansas Publ. Anthropol.

This monograph details the findings from the Schultz Mounds, A.D. 200-800. The majority of the lesions are described as those of osteitis, arthritis, osteoporosis, "malnourishment pitting," and trauma. Dental lesions and artifical cranial openings, probably postmortem and ceremonial, are also described.

418. **Phillips, E. D.** 1973. *Greek medicine.* London: Thames and Hudson.

This book, primarily concerned with medical history, refers to three probable cases of tetanus. As this disease does not affect the skeleton, such literary accounts provide the only evidence of the antiquity of the disease.

419. **Pickering, R. B.** 1979. Hunter-gatherer/agriculturalist arthritic patterns: a preliminary investigation. *Henry Ford Hosp. Med. J.* 27:50-53.

Skeletons from the Ledders site, Illinois, a late Woodland site, were examined for evidences of arthritis. Sexual differences found in the pattern, type, and intensity of disease were attributed to distribution of labor in a pre-agricultural society.

420. **Pietrusewsky, M.** 1971a. *Human skeletal remains at Anaehoomalu.* Honolulu: B.P. Bishop Museum, Dept. of Anthropol. Report 71-77.

Paleopathologic findings in the remains of sixty-nine individuals recovered from three proto-historic cave sites on the island of Hawaii are summarized. The lesions include those of arthritis, osteophytosis, and dental disorders.

421. **Pietrusewsky, M.** 1971b. An osteological study of cranial and infracranial remains from Tonga. *Rec. Auck. Inst. Mus.* 6:287-402.

A twenty page section systematically describes the lesions found in ninety-nine individuals recovered from two prehistoric Tongan burial mounds. Conditions included degenerative changes, trauma, infection and congenital disorders. Thirteen adults showed possible treponemal disease, perhaps yaws. A separate section covers dental pathology.

422. **Pike, A. W.** 1968. Recovery of helminth eggs from archeological excavations and their possible usefulness in providing evidence for the purpose of an occupation. *Nature* 219:303-304.

Soil from a Roman period site at Owlesbury, near Winchester, England, contained ascarid, trichurid or capillarid and *Dicrocoelium* ova, and other unidentified ova. Dating is discussed and the lack of more specific identification caused difficulty in the determination of the types of animals that inhabited the site.

423. **Pike, A. W. and Biddle, M.** 1966. Parasite eggs in medieval Winchester. *Antiquity* 40:293-296.

This article covers the same material as a chapter in Brothwell and Sandison's *Diseases in Antiquity* (1967).

424. **Pizzi, T. and Schenone, H.** 1954. Hallazgo de huevos de *Trichuris trichiura* en contenido intestinal de un cuerpo arquelógico incaico. *Bol. Chil. Parasitol.* 9:73-75. (The finding of *Trichuris trichiura* ova in the intestinal contents of an Inca body.)

The body of a child of eight or nine years was recovered from the frozen mountain subsoil 17,658 feet above Santiago, Chile, and the feces were studied for parasites. The burial was dated at about 1500 A.D. Large numbers of well preserved ova of *T. trichiura* were found as well as possible cysts of *Entamoeba coli* cysts. The absence of ascaris is noted. This finding suggests that *T. trichiura*, the whipworm, existed in pre-Conquest South America and that the parasite was subsequently transmitted to the Old World.

425. **Post, P. W. and Daniels, F., Jr.** 1969. Histological and histochemical examination of American Indian scalps, mummies, and a shrunken head. *Am. J. Phys. Anthropol.* 30:269-294.

Remarkable histological and histochemical detail was preserved in these specimens. This suggests the possibility of diagnosing skin diseases in mummified tissues. No such diseases were seen in the specimens studied.

426. **Post, P. W., Daniels, F., Jr. and Armelagos, G. J.** 1973. Ancient and mummified skin. *Cutis* 11:779-781.

A well illustrated discussion of some of the special stains useful in examining mummified skin.

427. **Post, P. W. and Donner, D. D.** 1972. Frostbite in a pre-Columbian mummy. *Am. J. Phys. Anthropol.* 37:187-192.

Radiographs of a male Chilean mummy are diagnosed as consistent with frostbite injuries. The burial position was that of a female. It is suggested that the subject was treated as female because of his injuries, or that the injuries were incurred during exposure as punishment for homosexuality.

428. **Powell, B. W.** 1970. Aboriginal trephination: case from southern New England? *Science* 170:732-734.

See Stewart, 1975.

429. **Prero, M. D.** 1970. An osteological analysis of a prehistoric California Indian site: Sac-43. M.A. thesis, Univ. of California, Davis.

Evidence of ill-health was common in these specimens. Females were more diseased than males. The incidence of caries (58%) was unusually high for California. The high prevalence of disease in these specimens, as compared with those from the Cook and Augustine sites, may represent population differences or problems of sampling.

430. **Pretty, G. L.** 1969. The Macleay Museum mummy from Torres Strait: a postscript to Elliot Smith and the diffusion controversy. *Man* 4:24-43.

An examination of this Papuan mummy reveals the mummification process and the underlying cultural concepts to be indigenous, as a refutation of Elliot Smith's concept of diffusion of cultural traits including mummification, from Egypt.

431. **Price, J. L.** 1975. The radiology of excavated Saxon and medieval remains from Winchester. *Clin. Radiol.* 26:363-370.

Examination of 2,000 skeletons showed many examples of trauma, both accidental and judicial, and infection. There were several examples of Paget's disease of bone and one calcified echinococcal cyst. No malignancies are mentioned, even though the author suggests that many of the population lived beyond fifty years.

432. **Price, J. L. and Molleson, T. I.** 1974. A radiographic examination of the left temporal bone of Kabwe Man, Broken Hill Mine, Zambia. *J. Archaeol. Sci.* 1:285-289.

By means of long X-ray exposures suitable radiographs were made of the fossilized cranium of Broken Hill Man. A small (8 mm) defect in the left temporal bone was felt to be antemortem and may have been the result of a benign tumor. A hole in the left mastoid is believed to have formed postmortem.

433. **Pucciarelli, H. M.** 1974. The influence of experimental deformation on neurocranial wormian bones in rats. *Am. J. Phys. Anthropol.* 41:29-39.

Experimental deformation of the rat neurocranium resulted in an increased number of wormian bones. Artificial deformation of human crania may modify the genetic expression of wormian bones, making the trait partly subject to extragenetic factors.

R

434. **Race, G. J., Fry, E. I., Matthews, J. L. et al.** 1968. Ancient Nubian human bone: a chemical and ultrastructural characterization including collagen. *Am. J. Phys. Anthropol.* 28:157-162.

Ultrastructural and chemical data are given, which are useful in interpreting changes in the process of fossilization. A suggested use is as a tool for dating.

435. **Rackerby, F.** 1957. The archeological salvage of two San Francisco Bay shellmounds. *San Francisco State Coll. Anthropol. Mus. Occasional Pap.* No. 3:1-83.

The burials from two sites in Alameda County are individually described; lesions are noted. Skull wounds and embedded projectile points were numerous. There was one instance of "head taking," in which the head was removed and placed between the knees.

436. **Rathbun, T. A.** 1972. *A study of the physical characteristics of the ancient inhabitants of Hasanlu, Iran.* Miami: Coconut Grove Field Research Projects.

The remains of 237 inhabitants of Hasanlu, Iran, an agricultural and animal husbanding society of the first millennium B.C., were examined. About one-third showed lesions, including alveolar abscesses (the most common lesion), osteoarthritis, osteitis, healed fractures, exostoses, and trauma. The descriptions are supplemented by a few photographs

437. **Rathbun, T. A.** 1975. *A study of the physical characteristics of the ancient inhabitants of Kish, Iraq.* Miami: Coconut Grove Field Research Projects.

The remains of 551 individuals were examined from this early city (2700-600 B.C.) in the northern Mesopotamian valley. One hundred fifty instances of disease were noted, including periodontoclasia, caries, osteitis, osteoarthritis, trauma, healed fractures, middle ear disease, cribra orbitalia, porotic hyperostosis, and abscesses. A few photographs are appended.

438. **Rathbun, T. A. and Mallin, R.** 1977. Middle ear disease in a prehistoric Iranian population. *Bull. N.Y. Acad. Med.* 53:901-905.

Six of fifteen skeletons from metal age Iran (1300-300 B.C.) showed evidence of middle ear disease. The associated impairment of hearing would have been significant. It is noted that these individuals died during their productive years, not in old age.

439. **Rathbun, T. A. and Mallin, R.** 1979. A probable trephination: not an enlarged parietal foramen. *Bull. N.Y. Acad. Med.* 55:717-723.

In a rebuttal to Hoffman (1979) the authors reject the criticism offered and make the excellent point that the specimen was and is available for examination. Cooperation in these difficult diagnostic cases is an ideal at which paleopathologists should aim.

440. **Ravin, J. G. and Hodge, G. P.** 1968a. Hallerman-Streiff syndrome diagnosed from a painting. *J. Pediatr. Ophthalmol.* 5:124-125.

See Hodge, 1977.

441. **Ravin, J. G. and Hodge, G. P.** 1968b. Hidden Spanish masterpieces. *J. Pediatr. Ophthalmol.* 5:248-251.

See Hodge, 1977.

442. **Ravin, J. G. and Hodge, G. P.** 1969. Hypertrichosis portrayed in art. *J.A.M.A.* 207:533-535.

See Hodge, 1977.

443. **Ravin, J. G., Hodge, G. P. and Hartman, J. J.** 1974. Stones of madness. *Mich. Med.* 73:185-201.

A number of European artists depicted "surgeons" removing stones from the head in order to cure various emotional problems. The "surgeon" made an incision in the scalp, without trephination, and plucked out stones, which he had deftly palmed and inserted into the bloody incision. The stones were symbolic of feces, and the procedure was a letting out of vile humors and substances as a cure for the patients' problems. (See Hartman et al., 1976.)

444. **Reader, R.** 1974. New evidence for the antiquity of leprosy in early Britain. *J. Archaeol. Sci.* 1:205-207.

A probable case of leprosy from a Romano-British cemetery in Dorset is described. The specimen consists of the distal portions of the shins and both feet. Archeologic dating is to the mid-fourth century A.D., which would make this specimen the earliest example of leprosy known from northern Europe. The changes are similar to those seen nowadays in lepromatous leprosy.

445. **Reed, E. K.** 1967. Variations of the spine in human skeletal material from southwestern archeological collections. See Wade, 1967, pp. 30-39.

Vertebral anomalies and lesions in 1,000 specimens are surveyed. Concentrating on the lumbosacral region, the article includes several line drawings presenting the more common traits reviewed.

446. **Reiley, D. E. and Birkby, W. H.** 1975. Two Kayenta Pueblo III cradle burials from upper Glen Canyon, Utah. *Plateau* 48:23-30.

Two burials were associated with cradle boards and dated to about 1200-1250 A.D. Only one of these contained a substantial amount of skeletal material. These incomplete remains are those of an infant aged two to five months. Porotic hyperostosis was noted grossly, but the usual "hair on end" was not seen on radiographs.

447. **Renfrew, C.** 1973. *Before civilization: The radiocarbon revolution and prehistoric Europe*. New York: Knopf.

This book discusses in detail the theory and application of carbon-14 dating, and its limitations and errors. Interpretation of results in the dating of ancient specimens is covered. Corrections for variation in past radiation levels are discussed.

448. **Reyman, T. A.** 1974. Histology and histopathology of Egyptian mummy tissue. *Lab. Invest.* 70:410.

A brief review of the histology and pathology of the first three mummies examined by the Paleopathology Association.

449. **Reyman, T. A.** 1976. Schistosomal cirrhosis in an Egyptian mummy (circa 1200 B.C.). *Yearbook Phys. Anthropol.* 19:356-358.

Schistosome ova were found in the intestine of Egyptian mummy ROM-I, in association with cirrhosis of the liver.

450. **Reyman, T. A.** 1977. Dead men do tell tales. In: *Science year: the World Book science annual* pp. 80-93. Chicago: Field.

A review of the history and studies of the Paleopathology Association. The study of Egyptian and Alaskan mummies is emphasized.

451. **Reyman, T. A.** 1979. The search for "arthritis" in antiquity. *Henry Ford Hosp. Med. J.* 27:32-37.

Ten groups of bone specimens were reviewed at a paleopathology symposium. There was general agreement on most of the diagnoses, but several problems were noted.

452. **Reyman, T. A., Barraco, R. A. and Cockburn, A.** 1976. Histological examination of an Egyptian mummy. *Bull. N.Y. Acad. Med.* 52:506-516.

The report on the autopsy of mummy PUM-II includes descriptions of periostitis of the fibula, atheroma of the thoracic aorta, pulmonary silicosis, and an embryonated ovum, probably *Ascaris lumbricoides*.

453. **Riddle, J. M.** 1979. Rheumatoid arthritis. *Henry Ford Hosp. Med. J.* 27:18-23.

The clinicopathologic features of rheumatoid arthritis are reviewed. The five cases reported in the literature of paleopathology are not considered proof that the disease existed as a distinct entity in antiquity. The earliest description in the medical literature dates from 1676. It is suggested that the disease is of fairly recent origin.

454. **Riddle, J. M., Khang-Loon, H., Chason, J. L. et al.** 1976. Peripheral blood elements found in an Egyptian mummy; a three dimensional view. *Science* 192:374-375.

Red blood cells have been seen in several mummies, but it has always been assumed that cell enzymes, bacteria, and other factors of decay would quickly destroy the leukocytes. Sections of an intracranial blood clot from mummy PUM-III revealed both red and white cells. Electron microscopy revealed the white cells to be intact and to contain nuclei and cytoplasmic granules. Platelets were also seen. Opinions as to the fate of individual cells after death must now be revised.

455. **Ritter, E. W. and Schultz, P. D.** 1975. Mortuary practices and health conditions among a small prehistoric population from Baja California Sur. *Pac. Coast Arch. Soc. Q.* 11:43-53.

A small sample (n = 49) of individuals recovered from late prehistoric rock shelters along the coast of Baja California was found to show generally good oral health, with low levels of attrition, one small dental cavity, minimal calculus, and no abscesses or enamel hypoplasia. The population had a marine diet, i.e., little grit, low levels of carbohydrate, and possibly high levels of fluoride.

456. **Rogers, S. L.** 1973. A case of surgical amputation from aboriginal Peru. *Ethnic Technology Notes, No. 11. San Diego: San Diego Museum of Man.*

The proximal half of a humerus with a smoothly rounded distal end is presented as a case of surgical amputation. Trephinations are evidence that Incas practiced surgery, and a Peruvian figurine depicts a man with an amputated foot and a stump cap. No differential diagnosis is offered.

457. **Rogers, S. L.** 1975. Artificial deformation of the head. New World examples of ethnic mutilation and notes on its consequences. *San Diego: San Diego Museum Papers No. 8.*

This concise, well illustrated article treats New World cranial deformations under the following headings: reasons for intentional deformation; time and method of deformation; classification of types; and results of deformation (i.e., changes in various cranial measurements and indices). The data are handled descriptively rather than analytically.

458. **Romero, J.** 1970. Dental mutilation, trephination and cranial deformation. In: *Handbook of Middle American Indians, vol. 9. Physical Anthropology,* vol. ed. T. D. Stewart, pp. 50-67. Austin: Univ. of Texas Press.

This excellent article describes and classifies more than 1,200 mutilated teeth from the New World. Nine individuals with cranial trephination from various Mexican archeological sites are next described and illustrated. Especially interesting is an example of trephining by a tubular drill. Survival time following surgery varied markedly. A short discussion of types of cranial deformation from Mexico concludes the chapter. The emphasis is on these practices as evidence of culture expressed in the skeleton.

459. **Rose, J. C.** 1977. Defective enamel histology of prehistoric teeth from Illinois. *Am. J. Phys. Anthropol.* 56:439-446.

Defective enamel can be differentiated from normal enamel by abnormal prism structure. The types of abnormality are discussed. It is pointed out that different populations show distinctive patterns of pathologic enamel. Since abnormal patterns are also influenced by dental morphology, comparisons should be made only between samples of identical dental type.

460. **Rose, J. C., Armelagos, G. J. and Lallo, J. W.** 1978. Histologic enamel indicator of childhood stress in prehistoric skeletal samples. *Am. J. Phys. Anthropol.* 49:511-516.

Lines of disturbed growth in enamel are considered to reflect periods of childhood stress. The technique of study is described. A positive correlation with mortality was found in three prehistoric American Indian populations. By the criteria of this study an increase in stress was also associated with conversion to maize agriculture.

461. **Roydhouse, R. H. and Simonsen, B. P.** 1975. Attrition of teeth. *Syesis* 8:263-273.

A review of adult crania with good dentition showed that early British Columbia Indians, New Zealand Maoris, Australian Aborigines, Huron Indians and Egyptians exhibited helicoidal occlusions. Comparisons of diets and environments suggested that the form of dental attrition is determined not by abrasion caused by food, but rather by repeated inter-

arch contact with or without fine fibrous food between the teeth. Aberrations in attrition were due mainly to accidental loss of the enamel rim on a worn tooth, with subsequent abrasion, or to the use of teeth as tools. The universality of the helicoidal pattern suggests that individual or population variations from this pattern should indicate variable cultural practices.

462. **Rudenko, S. I.** 1970. *Frozen tombs of Siberia*, edited and translated by M.W. Thompson. Berkeley: Univ. of Calif. Press.

Scythian tombs in the Altai Mountains of Siberia were encased in lenses of ice in such a fashion that the bodies and biologic materials in them were incredibly well preserved. The tombs had been robbed in antiquity, but the remaining grave goods and bodies verify the description by Herodotus of Scythian burial rites. When a chief died, his body was eviscerated, mummified, entombed, and covered by a cairn of stones. Other than a note that one man had been killed by a blow on the head by a battle axe, the investigation is directed at archeologic evaluation with no radiologic or paleopathologic examination of the bodies.

463. **Ryan, D. J.** 1972. The paleopathology of Ala-328: the relationships among disease, culture and environment in a California Indian population. Master's thesis, San Francisco State University.

Demographic information is used to support interpretations of skeletal lesions in material from the Middle and Late Horizons from Alameda County, San Francisco Bay area.

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464. **Sagne, S.** 1978. The use of the scanning electron microscope with X-ray equipment for the analysis of elements in medieval bones. *Ossa* 5:85-91.

Bone slices from medieval material were analyzed in a SEM with an energy-dispersive X-ray unit. A good state of preservation was observed, with the presence of calcium, phosphorus and certain other elements studied.

465. **St. Hoyme, L. E. and Koritzer, R. T.** 1970. Unusual dental pathology in an Illinois Indian circa 500 A.D. *Dent. Dig.* 76:386-387.

The total inversion of an impacted, carious upper anterior tooth observed in the skull of this Indian is described and illustrated. The possibility existed that a palatal lesion communicated to the tooth was the cause of the caries, which subsequently destroyed the crown of the tooth.

466. **St. Hoyme, L. E. and Koritzer, R. T.** 1976. Ecology of dental disease. *Am. J. Phys. Anthropol.* 45:673-686.

In spite of the title, this article is concerned with the reporting of trace elements in dental enamel from a sample of forty-three prehistoric Indians from Illinois, Maryland, and Virginia, analyzed by an optical emission spectrophotometer. The most common trace elements were Al, B, Ba, Cu, Fe, K, Mg, Mn, Na, Si, Sr and Ti. Tests suggested little soil contamination. Cultural, sex, and age differences were noted.

467. **Samuels, R.** 1965. Parasitological study of long-dried fecal samples. *Mem. Soc. Am. Archaeol.* 19:175-179.

Pinworm ova were seen in one of twenty specimens from a prehistoric Indian site at Wetherill Mesa, Colorado. The technique is discussed in detail.

468. **Sandison, A. T.** 1967. Sir Marc Armand Ruffer (1859-1917): pioneer of paleopathology. *Med. Hist.* 11:150-156.

This biography of Ruffer presents a critical yet complimentary appraisal of his work, and a complete bibliography.

469. **Sandison, A. T.** 1969. Diseases in ancient Egypt. *Riv. Antropol.* 56:225-227.

In ancient Egypt life expectancy was short, probably less than forty years among the nobility. The most important cause of death was infectious disease.

470. **Sandison, A. T.** 1970. The study of mummified and dried human tissues. In: *Science in Archeology,* eds. D. Brothwell and E. Higgs, pp. 490-502. New York: Praeger.

This is a complete survey of the history of mummification and the results of examination of mummified tissues. The references are virtually all-inclusive up to the late 1960s and constitute the starting point for the present current annotated bibliography.

471. **Sandison, A. T.** 1975. Kanam mandible's tumour. *Lancet* no. 7901, p. 279.

A mandible recovered by Leakey in Kenya and dating to 500,000 to 1,000,000 years ago has a tumoral swelling on the left side which has been suggested to be Burkitt's lymphoma (Stathopoulos, 1975). Sandison points out that it is not even clear that the lesion is neoplastic.

472. **Satinoff, M. I. and Wells, C.** Multiple basal cell nevus syndrome in ancient Egypt. *Med. Hist.* 13:294-297.

The syndrome is a genetic abnormality with multiple nevi and skin cancers. Cysts of the jaw and other skeletal deformities are common. Two cases were found in the Egyptian osteological collection at the University of Turin.

473. **Saul, F. P.** 1972. The human skeletal remains of Altar de Sacrificios: an osteobiographic analysis. *Papers of the Museum of Archaeol. Ethnol., Harvard Univ.* 63(2):1-124.

The health status of a lowland Maya population is examined through paleopathologic study of ninety individuals. Although a high incidence of debilitating disease was noted, no chronologic trend in patterns of disease could be discerned.

474. **Savage, H.** 1976. Human tissue preserved 3,000 years in Ontario. *Newsl. Ont. Arch. Soc.* 5:62-66.

Recognizable human soft tissues were found in a common grave at a multi-burial complex,

the Hind Site, dated to ca. 1000 B.C. Electron microscopy demonstrated collagen bundles and loose connective tissue with identifiable nuclei. Preservation is ascribed to the high copper content of the graves. Numerous copper artefacts, including beads and axes, were present; copper had stained the ground green.

475. **Sawicki, V. A., Allison, M. J. and Dalton, H. P.** 1976. Presence of *Salmonella* antigens in feces from a Peruvian mummy. *Bull. N.Y. Acad. Med.* 52:805-813.

One of four Peruvian mummies contained *Salmonella* antigens in the feces. Similar studies, in view of the known association of turkeys and human salmonellosis, are suggested for Mexico and the American Southwest where turkeys were domesticated.

476. **Sawyer, D. R., Allison, M. J., Elzay, R. P. et al.** 1976. Morphological characteristics of the pre-Columbian dentition. I. Shovel-shaped incisors, Carabelli's cusp, and protostylid. *Med. Coll. Va. Q.* 12:54-63.

The identification and charting of these three dental characteristics are reported in 195 mummies from six cultural groups spanning a time period from 600 B.C. to 1700 A.D. The high occurrence of shovel-shaped incisors and protostylid molars, and the low occurrence of Carabelli's cusps, are strongly suggestive of a Mongoloid ancestry for these Peruvian Indians. The higher occurrence of Carabelli's cusps in two of the groups, the Nazca and Inca, is suggested to be a result of Caucasian influence, i.e., the Spanish conquest. Dental features can be valuable in the study of ancient populations.

477. **Sawyer, D. R., Allison, M. J., Elzay, R. P. et al.** 1979. A study of torus palatinus and torus mandibularis in pre-Columbian Peruvians. *Am. J. Phys. Anthropol.* 50:525-526.

Variations in incidence of these tori, projections of hard bone from the hard palate and mandible, are seen in pre-Columbian populations from different areas of Peru and Chile. As the condition has a marked hereditary tendency, the trait is suggested as being useful in identifying population groups.

478. **Sawyer, D. R., Allison, M. J. and Pezzia, A.** 1976. Talon cusp: a clinically significant anomaly in a primary incisor from pre-Columbian America. *Med. Coll. Va. Q.* 12:64-66.

A talon cusp appearing in a primary left central maxillary incisor was found in the mummy of a child aged about five to six years. The anomaly presents as a horn-like projection from the lingual surface of the tooth, previously described in permanent teeth only.

479. **Schlosser, A.** 1978. Spinal lesions in early man. *Z. Orthop.* 116:902-904.

This article reviews evidence of traumatic and arthritic lesions of the vertebrae.

480. **Schultz, M.** 1978. Dysplastische Veränderungen an dem Schädel eines präkolumbischen Mimbres-Indianers aus Neu-Mexico - Ein Beitrag zum Turmschädel-Problem. *Z. Morphol. Anthropol.* 69:43-56. (Dysplastic change in the skull of a pre-Columbian Mimbres Indian from New Mexico - a contribution to the "tower-skull" problem.)

The malformed skull of a pre-Columbian Mimbres Indian is diagnosed as sphenoplatycephaly. The syndrome is discussed and the literature reviewed.

481. **Schultz, M.** 1979. Diseases in the ear region in early and prehistoric populations. *J. Hum. Evol.* 8:575-580.

Temporal bones from southern Germany (500-725 A.D.) and New Mexico (980-1490 A.D.) were studied. Abscesses, fistulae, calcified cholesteatomas, and other signs of inflammation appeared more frequently than is generally thought. In the German group this finding appeared to be class related, suggesting a strong environmental influence.

482. **Schultz, P. D.** 1977. Task activity and anterior tooth grooving in prehistoric California Indians. *Am. J. Phys. Anthropol.* 46:87-92.

Approximal and occlusal surface grooving of anterior maxillary and mandibular teeth of all adults in a small prehistoric population is tentatively explained as the result of pulling fibrous material across the teeth during the manufacturing of baskets or cords, an example of culturally induced lesions.

483. **Sciulli, P. W.** 1978. Developmental abnormalities of the permanent dentition in prehistoric Ohio Valley Amerindians. *Am. J. Phys. Anthropol.* 48:193-198.

A survey of 389 prehistoric skeletons showed abnormalities of enamel formation and in the size, shape, and number of the teeth. Relationships between certain groups are suggested on the basis of similarity in incidence of abnormalities. The relative infrequency of enamel hypoplasia in one group is held to be cultural, i.e., selection of a high-status group for burial.

484. **Sergi, S., Ascenzi, A. and Bonucci, E.** 1972. Torus palatinus in the Neanderthal Circeo I skull. A histologic, microradiographic and electron microscopic investigation. *Am. J. Phys. Anthropol.* 36:189-198.

Investigation of a palatal overgrowth in a Neanderthal skull from Monte Circeo, Italy revealed excellent preservation of structural detail. It had been suggested that such lesions were secondary to inflammation, but there is increasing evidence of its genetic nature.

485. **Shackleford, J. M. and Wyckoff, F. W.** 1964. Collagen in fossil teeth and bones. *J. Ultrastruct. Res.* 11:173-180.

Ultrathin sections were cut from a variety of fossil teeth and bones. Electron micrographs show the collagen and other organic material that they contain and suggest alterations with time.

486. **Shermis, S.** 1975. Common types of paleopathological lesions and some cultural inferences. *Pac. Coast Arch. Soc. Q.* 11:33-58.

This well-illustrated review stresses the importance of an understanding of cultural factors in the distribution and significance of ancient disease as well as the tenuous nature of most diagnoses based on dry osseous remains. Topics include trauma, infection, arthritis, nutrition, developmental defects, neoplasms, and epidemiology.

487. **Short, C. L.** 1974. The antiquity of rheumatoid arthritis. *Arthritis Rheum.* 17:193-205.

The author contends that there are no convincing examples of rheumatoid arthritis in the paleopathologic record. The term was introduced in England in 1859, while the earliest description of the disease was probably that by Thomas Sydenham in 1676. The author speculates that ankylosing spondylitis may have been the original and sole form of rheumatoid disease, and that the disease known as peripheral rheumatoid arthritis evolved sometime in the Christian era.

488. **Sjovold, T.** 1975. Tables of the combined method for determination of age after death given by Nemeskeri, Harsanyi and Ascadi. *Anthropol. Kozl.* 19:9-22.

Tables are given for determination of age at death, based on four osseous indicators. A brief introduction is included.

489. **Sjovold, T., Swedborg, I. and Diener, L.** 1974. A pregnant woman from the Middle Ages with exostosis multiplex. *Ossa* 1:3-23.

The skeleton of a woman of about seventeen to twenty years of age, from the island of Gotland, who died in childbirth, was studied. Exostoses protruding from the ilium prevented birth of the fetus, which also showed evidence of congenital osteochondromatosis.

490. **Skinsnes, I. K., ed.** 1975. An ancient Briton adds to the story of leprosy. *Int. J. Lepr.* 44:387-388.

Remains of parts of two legs from a Roman-British cemetery (ca. 350 A.D.) showed changes considered to be absolutely diagnostic of leprosy, antedating the previous earliest case in England by 700 years. (See Jonquires, 1977, however.) A search is being made for additional specimens.

491. **Smith, G. S., Bradley, Z. A., Kreher, R. E. et al.** 1978. *The Kialegak Site, St. Lawrence Island, Alaska: Part I, Archeological survey. Part II, Examination of a 1,600-year-old frozen body.* Fairbanks: Univ. of Alaska.

This book covers the geography and archeology of the site of discovery of the St. Lawrence Island frozen Eskimo mummy. The complete report on the mummy includes the anatomical examination, and examination of the teeth and jaws, temporal bones and skeleton, mercury level, and blood typing. Most of this material has been published elsewhere, but this is the only single complete statement available. (See Smith and Zimmerman, 1975 and Zimmerman and Smith, 1975.)

492. **Smith, G. S. and Zimmerman, M. R.** 1975. Tattooing found on a 1,600-year-old frozen, mummified body from St. Lawrence Island, Alaska. *Am. Antiq.* 40:434-437.

Beach erosion at Cape Kialegak on the island revealed the frozen, naturally mummified 1,600-year-old body of an Eskimo woman. There was extensive tattooing on the dorsal aspects of both the right and left forearms, hands, and fingers. The pattern of the tattoos

corresponds with known design patterns for the Old Bering Sea phase of Alaskan prehistory.

493. **Smith, P.** 1977. Regional variation in tooth size and pathology in fossil hominids. *Am. J. Phys. Anthropol.* 47:459-466.

Teeth of fossil hominids from the Pleistocene of Asia, Europe and Africa showed little variation in size but marked differences in the severity of attrition and incidence of abscess, periodontal disease, and antemortem dental loss. The high degree of disease in the European samples is attributed to abrasive diets.

494. **Smith, P. and Tau, S.** 1978. Dental pathology in the period of the Roman Empire - a comparison of two populations. *Ossa* 5:35-41.

Comparison of teeth and jaws from Romans and Jews living in first and second century Israel confirmed the different genetic makeup of the groups. Differences in disease patterns were attributed to diet. There was a tendency to increased caries over time, similar to that seen in Europe over the same period, supporting the hypothesis that widespread changes in patterns of dental disease occurred during the Roman period.

495. **Snow, C. E.** 1974. *An initial study of skeletal remains from Makapu, Oahu.* Lexington: Univ. Press of Kentucky.

One chapter of this detailed study of over 1,000 prehistoric burials from the northeast coast of Oahu, Hawaiian Islands, describes bone lesions. Degenerative joint disease was common, while fractures and other evidence of trauma were rare. Spina bifida, clubfoot, microcephaly, and asymmetry of the face and occiput were relatively common. Dental disease is discussed.

496. **Stastny, P.** 1974. HL-A antigens in mummified pre-Columbian tissues. *Science* 183:864-865.

Extracts of tissues ranging from 500 to 2,000 years old were found to inhibit specific antibodies to HL-A, two-thirds of the specimens giving positive results. Distribution of antigens found was similar to that in modern descendants of the ancient populations.

497. **Stathopoulos, G.** 1975. Letter: Kanam mandible's tumour. *Lancet* no. 7899, p. 165.

It is suggested that the swelling in the 500,000 to 1,000,000-year-old Kanam mandible is Burkitt's lymphoma, as the individual was young and the Pleistocene climate of Kenya was similar to that of modern southern Africa.

498. **Steele, J. P., Gregg, S. C. and Holzhueter, A. M.** 1965. Paleopathology in the Dakotas. *S.D. J. Med.* 18:17-29.

Types of pathologic processes found in Indian burials in the Dakotas are described briefly. This paper is intended to aid the many part-time archeologists among the physicians of the area and to stimulate further interest in this subject. Good illustrations are included.

499. **Steinbock, R. T.** 1976. *Paleopathological diagnosis and interpretation: bone diseases in ancient human populations.* Springfield, Ill.: C.C. Thomas.

Steinbock illustrates virtually all bone lesions, considering differential details and evaluating the literature back to the eighteenth century considering both bone-response and population-ecology. Text and illustrations are excellent. Topics are covered in a logical succession: bone physiology, trauma, infections, anemia, metabolic disease, arthritis, and benign and malignant tumors. There are some omissions, such as acromegaly, some genetic disorders, and indirect effects of endocrine or infectious disease. Problems needing new research are flagged, as this book looks to the future. It brings into focus our past and current picture of bone paleopathology in a manner useful not only to anthropologists but also to radiologists, physicians, and historians.

500. **Steinbock, R. T.** 1979. Lead ingestion in history. *N. Engl. J. Med.* 301:277.

This Letter to the Editor provides a brief but thorough and well-referenced history of lead technology and poisoning. The role of lead in the fall of Rome, in gout in eighteenth and nineteenth century England, and in the American colonies is covered.

501. **Stenn, F. F., Milgram, J. W., Lee, S. L. et al.** 1977. Biochemical identification of homogentisic acid pigment in an ochronotic Egyptian mummy. *Science* 197:566-568.

Radiopacity of intervertebral discs is frequent in Egyptian mummies. This highly technical paper presents the chemical analysis of a black pigment deposited in the arthritic hip of a mummy which showed opacification of discs. The diagnosis of ochronosis was made. However, the extrapolation to other mummies may be unwarranted, as is the accusation of "frequent intrafamilial marriage," a practice now thought to be confined to royalty in ancient Egypt.

502. **Stenn, F. F., Milgram, J. W., Lee, S. L. et al.** 1979. Biochemical discovery of homogentisic acid pigment in an ochronotic Egyptian mummy. *Henry Ford Hosp. Med. J.* 27:44-49.

An infrared absorption technique was applied to cartilage from a 1,500-year-old Egyptian mummy. Homogentisic acid was identified, substantiating the diagnosis of ochronosis.

503. **Stewart, T. D.** 1974. Nonunion of fractures in antiquity, with descriptions of five cases from the New World involving the forearm. *Bull. N.Y. Acad. Med.* 50:875-891.

The author reviews the literature on nonunion of fractures in prehistory, and present several New World cases of ununited fracture of the forearm. Included are two cases in which pseudoarthrosis had developed.

504. **Stewart, T. D.** 1975. Cranial dysraphism mistaken for trephination. *Am. J. Phys. Anthropol.* 42:435-437.

Sublett and Wray (1970) reported two possible cases of trephination from New England. Stewart suggests that they are typical examples of a herniated sac, an encephalocele, in the midline of the skull at or just in front of bregma. The condition is called dysraphism and includes two related defects, spina bifida and cranium bifidum. Stewart reports a third case from Peru.

505. **Stewart, T. D.** 1976. Are supra-inion depressions evidence of prophylactic trephination? *Bull. Hist. Med.* 50:414-434.

Depressions in the upper portion of the occipital bone are explained as due to pressure necrosis from culturally determined cranial deformation procedures. It had been suggested that these lesions were prophylactic trephinations performed in childhood to prevent headache in adult life.

506. **Stothers, D. M. and Metress, J. F.** 1975. A system for the description and analysis of pathological changes in prehistoric skeletons. *Ossa* 2:3-9.

The authors outline a method for recording non-specific lesions and illustrate the method in a comparison of two Iroquoian ossuaries. Gross and microscopic studies distinguished various forms of osteomyelitis and periostitis. Post-contact increases in the involvement of specific bones are attributed to epidemics introduced by Europeans.

507. **Stout, S. and Simmons, D. J.** 1979. Use of histology in ancient bone research. *Yearbook Phys. Anthropol.* 22:228-249.

The microscopic architecture of modern and archeologic bone is reviewed and techniques are discussed for determinations of age and disease. The literature contains many conflicting reports with regard to aging, and the diagnosis of metabolic disease is made difficult by the limited range of response of bone to stress. The article concludes with a brief discussion of osseous traits which may distinguish wild from domestic animals.

508. **Stout, S. and Teitelbaum, S. L.** 1976a. Histological analysis of undecalcified thin sections of archeological bone. *Am. J. Phys. Anthropol.* 44:263-270.

A method of embedding ancient bone in plastic (methylmethacrylate) is presented. Some preliminary results of histologic analysis are given. It was demonstrated that the method can be generally useful in identifying structural details of bone that many previous authors thought impossible of recognition. The possible applications in the identification of specific pathologic processes in old bone are mentioned.

509. **Stout, S. D. and Teitelbaum, S. L.** 1976b. Histomorphometric determination of formation rates of archeological bone. *Calcif. Tissue Res.* 21:163-169.

Age-associated changes in the histomorphology of bone are shown to be the same for extinct as for extant populations. Ribs dating from 900 to 1600 years B.C. were used. The Eskimo reported by Zimmerman and Smith (1975) was aged at fifty to fifty-nine years and did not show the osteoporosis seen in modern Eskimos in the sixth decade of life.

510. **Strouhal, E.** 1976a. Multidisciplinary research on Egyptian mummies in Czechoslovakia. *Z. Aegypt. Spr. u. Alt.* 103:113.

This general survey of the approximately one hundred mummies in Czechoslovakia presents data on dating and demography.

511. **Strouhal, E.** 1976b. Tumors in the remains of ancient Egyptians. *Am. J. Phys. Anthropol.* 45:613-620.

Two new cases of tumors in Egyptian skeletons are presented. One is a calcified leiomyoma of the uterus, the other a carcinoma of the nasopharynx. The latter shows a large area of destruction of the face and base of the skull. A degree of peripheral osteoblastic response is

described which seems to favor an infectious or benign tumoral process rather than a malignancy. However, see Strouhal, 1978. An uncritical review of the literature on masses and defects in skeletons is included. Histologic confirmation of the presence of cancer in ancient Egypt is still lacking.

512. **Strouhal, E.** 1977. Two cases of polytopic osteolytic lesions in the pyramid Egyptians. *Ossa* 3/4:11-52.

Detailed studies are presented of two Fifth and Sixth Dynasty individuals excavated from Naga-ed-Der and deposited in the Lowie Museum. Unusual cranial and vertebral lesions in both cases are diagnosed as Hand-Schuller-Christian disease. The author describes a similar case in the early literature.

513. **Strouhal, E.** 1978. Ancient Egyptian case of carcinoma. *Bull. N.Y. Acad. Med.* 54:290-302.

This paper is a more detailed report of the Old Kingdom skull previously reported by Strouhal (1976b). There was extensive destruction of the face and sphenoid region of the base, caused most probably by a tumor originating in the nasopharynx. The margins of the defect reveal the predominantly osteolytic nature of the tumor. The osteoblastic reaction is much more limited than it seemed at the time of the earlier description. The present report makes a much more convincing case for malignancy — probably primary carcinoma of the nasopharynx. A small lesion on the external surface of the right squama is probably a secondary deposit.

514. **Strouhal, E. and Jungwirth, J.** 1971. Anthropological problems of the Middle Empire and late Roman Sayala (preliminary report on the first stage of the elaboration of the Austrian anthropological material from Nubia). *Mitt. Anthropol. Gesell. (Wien)* 100:10-23.

This anthropologic study of Nubian grave material covers the period from 9000 B.C. to the tenth century A.D. Dental pathology, arthritis, fractures, and wounds are noted.

515. **Strouhal, E. and Jungwirth, J.** 1977. Ein verkalktes Myoma uteri aus der späten Römerzeit in Aegyptisch-Nubien. *Anthropol. Gesell. Wien* 107:215-221. (A calcified uterine leiomyoma of the late Roman period from Nubian Egypt.)

A calcified nodule was found within the pelvic skeleton of a thirty-five to forty-five-year-old woman dated to the third to fourth centuries A.D. Macroscopic, radiographic, microscopic, and chemical studies suggest the structure to be a calcified uterine leiomyoma; some preserved organic material was present. This case appears to be unique in the literature.

516. **Strouhal, E. and Vyhnanek, L.** 1974. Radiographic examination of the mummy of Qenamun the seal-bearer. *Z. Aegypt. Spr. u. Alt.* 100:125-129.

A mummy of a sixty-year-old man of the Eighteenth Dynasty was examined grossly and radiographicaly. Osteoporosis, arteriosclerosis, and a femoral fracture were found. The subject is well known to archeologists as the chief steward of Amenophis II.

517. **Strouhal, E. and Vyhnanek, L.** 1976a. Survey of Egyptian mummies in Czechoslovak collections. *Z. Aegypt. Spr. u. Alt.* 103:114-118.

One hundred sixty-eight mummies (99 human and 69 animal) were found in Czech collections. Most of the humans were late dynastic, and most were mature males. Possible differential mummification practices are discussed.

518. **Strouhal, E. and Vyhnanek, L.** 1976b. Result of examination of the mummy of Qenamun. *Act. Fac. Rerum. Natl. Univ. Com. Anth.* 22:235-239.

Radiologic examination of a poorly preserved New Kingdom mummy from the Luxor area revealed it to be the remains of an elderly man with an underdeveloped musculoskeletal system, who probably died of the sequelae of a fracture of the hip. Atherosclerosis and several postmortem fractures were observed also. The authors feel that these findings correlate well with the known biographical information for Qenamun, an intimate of Amenophis II who died in disgrace during the reign of Amenophis' successor, Tuthmosis IV. The case for the mummy actually being that of Qenamun may be overstated; the evidence merely does not exclude the possibility.

519. **Sublett, A. J. and Wray, C. F.** 1970. Some examples of accidental and deliberate human skeletal modification in the Northeast. *Bull. N.Y. State Archeol. Assoc.* 50:14-26.

A diagnosis of trephination in a skull from New England is suggested. However, see Stewart, 1975.

520. **Suchey, J. M.** 1979. Problems in the aging of females using the os pubis. *Am. J. Phys. Anthropol.* 51:467-470.

Attempts at age determination of a set of 11 pubes of known age by 23 forensic anthropologists yielded an accuracy of only 51 percent. The Gilbert-McKern method was used. It was concluded that interobserver error was due to difficulty in assessing the state of the ventral rampart and the symphyseal rim. More experienced anthropologists were found to be more accurate.

521. **Sulzer, A. J., Sulzer, K. R., Cantella, R. A. et al.** 1978. Study of coinciding foci of malaria and leptospirosis in the Peruvian Amazon area. *Trans. R. Soc. Trop. Med. Hyg.* 72:76-83.

A controversy exists as to the presence or absence of malaria in pre-Columbian America. Some postulate the existence of *Plasmodium vivax* and *P. malariae* in the Americas before the fifteenth century. The authors have found such a mixture of infections in a remote valley in the mountains of Peru, and suggest that in this isolated area the original malaria has survived without the admixture of *P. falciparum.*

522. **Swales, J. D.** 1973. Tutankhamun's breasts. *Lancet* no. 7796, p. 201.

See Gray, 1973.

523. **Swedborg, I.** 1974. *Degenerative changes of the human spine - a study on dried macerated skeletons.* Stockholm, Sweden: No publisher mentioned.

An examination was made of 1,126 human skeletons from tenth to twelfth century Poland. Of these, 372 showed some evidence of degenerative vertebral changes of various types.

Specimens were divided by sex and age, and incidences and correlations of the various lesions were calculated. The findings included: a lack of sexual dimorphism; Schmorl's nodes most common in the lower thoracic region, the incidence of osteophytosis increasing from the cervical through the lumbar regions; and osteochondrosis most common in the cervical and lumbar regions. An interesting correlation was observed between osteophytosis and ossified ligamenta flava, suggesting a possible common pathogenesis, as yet unknown.

524. **Swedborg, I.** 1975. Studies of macerated human spine - a background for the clinical approach to the degenerative process. *Ossa* 2:15-21.

An ethnically and geographically homogeneous population from tenth to twelfth century Poland was studied. Thirty-three percent of the specimens showed degenerative changes of the vertebral column. The types and frequencies of changes are described.

525. **Swedlund, A. C. and Armelagos, G. J.** 1976. *Demographic anthropology.* Dubuque, Iowa: Brown.

This text on the techniques of population studies contains a brief review of paleopathology which emphasizes the paleodemographic approach.

526. **Szidat, I.** 1944. Ueber die Erhaltungsfähigkeit von Helmintheneiern in Vor-und Frühgeschichtlichen Moorleichen. *Z. Parasitenkd.* 13:265-274. (On the preservation of helminth eggs in pre- and early historical bog bodies.)

The intestines of two well preserved bodies, the Dröbnitz Girl (600 B.C.) and the Karwinden Man (500 A.D.) from the moorland in East Prussia (Polish Lakeland) were examined for parasites. Both contained ova of *Ascaris lumbricoides* and *Trichuris trichiura.* The man's intestines also contained mite eggs, a plant nematode, and a possible fish tapeworm, *Bothriocephalus latus.* The helmith ova from the girl were virtually indistinguishable from those in modern infections, and the proportions of the two worm species correspond to the proportions found in the contemporary (1939) rural population of East Prussia.

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ESSAY - REVIEW

JOHN C. ECCLES and WILLIAM C. GIBSON. *Sherrington, His Life and Thought.* Berlin, N.Y.: Springer International, 1979. xv, 269 pp. (illus.). $18.70.

Reviewed by ERNST JOKL

Sherrington, His Life and Thought is the latest of a series of monographs which Eccles has compiled or edited over the past decade. Written in collaboration with Professor William C. Gibson, Director of the Department of Science and Medicine, Medical Schools University of British Columbia, the book is, so its publisher claims, the "definitive Sherrington biography for many years to come." This is a statement of interest in view of the fact that a number of excellent studies of Sherrington and his work have been available for some time, among them Lord Cohen of Birkenhead's *Sherrington, Physiologist, Philosopher and Poet* (1958); E.G.T. Liddell's *The Discovery of Reflexes* (1960); Ragnar Granit's *Charles Scott Sherrington, An Appraisal* (1967); and Judith P. Swayzey's *Reflexes and Motor Integration: Sherrington's Concept of Integrated Action* (1969).

Eccles and Gibson acknowledge their indebtedness to Lord Adrian and Professor A. V. Hill, also to several members of the "Sherrington team" during the Oxford years, among them John Fulton, Graham Brown, A.D. Ritchie and Ragnar Granit, Eccles' colleague during his early studies with Sherrington. In 1963, when Eccles received the Prize in Stockholm, Granit made the presentation speech on behalf of the Nobel Committee for Physiology and Medicine of the Royal Caroline Institute. By far the best account of Sherrington's life is that by Granit. It presents Sherrington's scientific and philosophical contributions as part of the historical development of physiology from the second half of the nineteenth century until the early 1920s.

ECCLES

John Eccles, now Sir John Eccles, came to Oxford from Australia as a Rhodes Scholar in 1925, at the age of twenty-two. There he attended lectures by Sir Charles Sherrington — an encounter that turned out to be the Damascus of his life. From 1928 to 1931 Eccles was research assistant to Sherrington. In 1929 he was awarded the degree of D. Phil. at Oxford; his thesis was titled "Excitation and Inhibition." Thereafter he stayed on as a member of the teaching staff at Exeter and Magdalen Colleges until 1937, when he left England to return to Australia where he became director of a medical research unit in Sydney. There he worked with Bernard Katz, now Sir Bernard Katz, and with Stephen Kuffler. From 1944 to 1951 he was Professor of Physiology at the University of Otago, New Zealand; from 1952 to 1966 Professor of Physiology at the Australian National University in Canberra. In 1963 Eccles was awarded a Nobel Prize in Physiology and Medicine for his work on the ionic

mechanism of postsynaptic inhibition. From then onward Eccles devoted his efforts to a philosophical interpretation of neurophysiology; in this he was joined by the Austrian-born Karl Popper, now Sir Karl Popper, whom he first met in New Zealand. In collaboration with Popper, Eccles developed what he described as "hypotheses of the greatest generality" that enabled him, so he writes, to come to grips with the problem of the neurophysiological basis of mind. For the past twenty-five years this theme has continuously fascinated him, not only on the intellectual level; "it also helped me emotionally," he stated.[1]

The following is a brief *curriculum vitae* of Sherrington to which Eccles and Gibson have provided new material, including data on Sherrington's last decade in Oxford (1925-1935), and on "Major Correspondents in his Later Years." Seventeen appendices have been made available by Sir Charles' son, Carr, and his wife, including an obituary article on H. Longfellow; memorials of Ramón y Cajal and of Osler; and notes relating to his cooperation with Professor Samson Wright who, as honorary secretary of the 1947 International Congress of Physiology, was instrumental in arranging the republication of the Silliman Lectures Sherrington gave at Yale in 1904.

SHERRINGTON

Charles Scott Sherrington was born on November 27, 1857, at Islington, London. He was the son of James Norton Sherrington, of Caister, Great Yarmouth, who died when Sherrington was a young child. Sherrington's mother later married Dr. Caleb Rose of Ipswich, a good classical scholar and a noted archaeologist whose interest in the English artists of the Norwich School no doubt gave Sherrington the interest in art that he retained throughout his life.

In 1876 Sherrington began medical studies at St. Thomas's Hospital. In 1878 he passed the primary examination of the Royal College of Surgeons, and a year later the primary examination for the Fellowship of that College. After a short stay at Edinburgh, he went in 1879 to Cambridge as a non-collegiate student studying physiology under Michael Foster, and in 1880 entered Gonville and Caius College there.

In 1881 he attended a medical congress in London at which Sir Michael Foster discussed the work of Sir Charles Bell and others on the experimental study of the functions of nerves that was then being done in England and elsewhere in Europe. At this congress controversy arose about the effects of excisions of parts of the cortex of the brains of dogs and monkeys; this work had been done by Ferrier and Goltz of Strasbourg. Subsequently, Sherrington worked on this problem in Cambridge with Langley, and in 1884 published a paper on it in collaboration with him. In this manner Sherrington was introduced to the neurological work to which he afterwards devoted his life.

In 1883 Sherrington became Demonstrator of Anatomy at Cambridge under Professor Sir George Humphrey, and during the winter session of 1883-84 at St. Thomas's Hospital he was Demonstrator of Histology.

The years 1884 and 1885 were eventful ones for Sherrington, for during the winter

1. *Noble Lectures in Physiology or Medicine 1963 - 1970* (Amsterdam, London, N.Y.: Elsevier Publishing Co., 1972), p.. 29.

of 1884-85 he worked with Goltz at Strasbourg. In 1884 he obtained his M.R.C.S., and in 1885 a First Class in the Natural Sciences Tripos with distinction at Cambridge. During this year he published a paper of his own on the subject of Goltz's dogs. In 1885 he also took his M.B. degree at Cambridge and in 1886 his L.R.C.P.

In 1885, as a member of a Committee of the Association for Research in Medicine, Sherrington went to Spain to study an outbreak of cholera, and in 1886 he also visited the region of Venice to investigate the same disease. The material then obtained was examined in Berlin under the supervision of Virchow, who later sent Sherrington to Robert Koch for a six week course in technique. Sherrington stayed with Koch to do research in bacteriology for a year. In 1887 he was appointed Lecturer in Systematic Physiology at St. Thomas's Hospital, London, and was elected a Fellow of Gonville and Caius College, Cambridge. In 1891 he was appointed successor to Sir Victor Horsley, Professor and Superintendent of the Brown Institute for Advanced Physiological and Pathological Research in London. In 1895 he became Professor of Physiology at the University of Liverpool.

During his earlier years in Cambridge, Sherrington took up the study of the spinal cord. He had been influenced by W.H. Gaskell and by the Spanish neurologist, Ramón y Cajal, whom he had met during his visit to Spain. By 1891 his mind had turned to the problems of spinal reflexes, which were much discussed at that time. Sherrington published several papers on this subject, and during 1892-94 others on the efferent nerve supply of muscles. From 1893 to 1897 he studied the distribution of the segmented skin fields, and made the important discovery that about one-third of the nerve fibers in a nerve supplying a muscle are afferent, the remainder being motor.

At Liverpool he returned to his earlier study of the problem of the innervation of antagonistic muscles and showed that reflex inhibition played an important part in it. In addition he was studying the connection between the brain and the spinal cord by way of the pyramidal tract. At this time he was visited by Harvey Cushing, the American surgeon, who stayed with him for eight months.

In 1906 he published his well-known book, *The Integrative Action of the Nervous System*; this book consisted of his Silliman Lectures, given at Yale University two years earlier. In 1913 he was invited to become Waynfleet Professor of Physiology at Oxford, a post for which he had applied unsuccessfully in 1895. He remained at Oxford until his retirement in 1936. Here, in 1919, he wrote and published his classic book, *Mammalian Physiology: a Course of Practical Exercises,* and here he regularly taught the students for whom this book was written.

During the First World War, as Chairman of the Industrial Fatigue Board, he worked for a time in a shell factory at Birmingham. The daily shift of thirteen hours, with a Sunday shift of nine hours, did not tire him, although by then he was fifty-seven years old.

The predominant notes of his character were humility, friendliness, and the generosity with which he gave his advice and valuable time to others. In 1925 he published a book of poetry entitled *The Assaying of Brabantius and other Verse*; one reviewer expressed the hope that "Miss Sherrington" would publish more verse. He was also sensitive to the music of prose.This trait and his poetical trait, as well as his ability in biology and philosophy, were evident in his Rede Lecture given at Cambridge in 1933 on *The Brain and its Mechanism.* In this essay he denied our scientific right to join mental with physiological experience.

The philosopher in him ultimately found expression in his great book *Man on His Nature,* which contained his Gifford Lectures for 1937-38. This book, published in

1940, presents the life and views of the sixteenth century French physician, Jean Fernel, as well as Sherrington's own views. In 1947 he published another volume entitled *The Endeavour of Jean Fernel.*

Sherrington was elected a Fellow of the Royal Society of London in 1893. He gave the Croonian Lecture in 1896; he was awarded the Royal Medal in 1905 and the Copley Medal in 1927. In 1922 the Knight Grand Cross of the Order of the British Empire and in 1924 the Order of Merit were conferred upon him. He held honorary doctorates from the Universities of Oxford, London, Sheffield, Birmingham, Manchester, Liverpool, Wales, Edinburgh, Glasgow, Paris, Strasbourg, Louvain, Uppsala, Lyons, Budapest, Athens, Brussels, Berne, Toronto, Montreal, and Harvard.

As president of the Royal Society, Sherrington presented the Copley Medal to Albert Einstein in 1924. In 1932, he shared a Nobel Prize in Physiology and Medicine with Edgar D. Adrian. In 1933 the Pope named Sherrington a member of the Pontifical Academy of Sciences.

He died at Eastbourne in 1952, at the age of 94.[2]

EXPERIMENTAL ANALYSIS AND PHILOSOPHICAL INTERPRETATION

Sherrington's place in physiology can be compared only with that of Einstein in physics and Otto Warburg in biochemistry. Lord Cohen writes that Sherrington's Silliman Lectures, given at Yale in 1904, rank in importance with Harvey's *De Motu Cordis,* while Sir Francis Walshe compared their influence upon physiology with that of Newton's *Principia* upon physics. It is of interest in this context that according to John Fulton, "the large audience which attended the first of Sherrington's Silliman Lectures at Yale in 1904 had dwindled to four people at the last lecture."

Sherrington's distinction derives from two different kinds of contributions: from his experimental analysis of the functional morphology of the nervous system, and from the philosophical interpretation that he gave to his data.

In his *Rede Lectures and Gifford Lectures*, Sherrington set out to show that application of the methodological armamentarium of the natural sciences has resulted in strikingly fruitful clarification of structure and function of the brain, but that it has been incapable of doing likewise for the mind. "The mental," Sherrington writes, "is not examinable as a form of energy." All of Sherrington's biographers have dealt in detail with the conceptual dichotomy of energy and mind thus outlined. Some of them concluded that a strictly dualistic approach to the brain-mind problem is needed. René Descartes' idea of the *res extensa* and the *res cogitans* continues to appeal — at times in modified form — to many contemporary thinkers, chief among them Eccles, who in 1975 presented an elaborate "dualist-interaction theory" of a self-conscious mind. The theory,

2. *Noble Lectures in Physiology or Medicine 1922 - 1941* (Amsterdam, London, N.Y.: Elsevier Publishing Co., 1965), pp. 290-292.

however, is not derived from the results of Eccles' researches for which he received a Nobel Prize in 1963. The "dualist-interaction theory" represents a product of imagination. Experimental studies by Kornhuber, Sperry, and Libet which Eccles believes support the validity of his theory were not so interpreted by their authors.

ECCLES' DUALIST-INTERACTION THEORY

The essential feature of Eccles' "dualist-interaction theory" is that mind and brain are independent entities which somehow interact. Eccles postulates the existence of actual frontier lines in the brain across which takes place "interaction with and through the self-conscious mind." Such interaction "can be conceived as a flow of information, not of energy." "Thus," Eccles writes, "we have the extraordinary doctrine that the world of matter-energy is not completely sealed, which is a fundamental tenet of physics, but that there are small 'crevices' in what otherwise is the completely closed world of 'Physical Objects and States.' On the contrary the closedness of the World of Physical Objects and States has been safeguarded with great ingenuity in all materialist theories of the mind." "Yet," he concludes, "I shall argue that this is not their strength, but instead their fatal weakness."[3] Eccles thus took it upon himself to redefine *energy,* an undertaking of which Sherrington expressedly stated "we do not have in our power to re-fashion a concept shaped by our sense perception."[4,22]

Until 1975, Eccles' philosophical position had been approximately equivalent to neo-Cartesian dualism. "I believed," he wrote in 1979, "that the 'self-conscious mind' was an immaterial entity distinct from the brain." "However," he explained, "if, as I then believed, the self-conscious mind was merely reading out from the spatio-temporal patterned operation of the brain, I came to realize that eventually there must be reduction of even the most esoteric thoughts and the most subtle decisions to the brain events from which they were derived. Parallelism would prevail. Brain events are entirely within the physical world and, as we know, according to parallelism, the happenings in the neural machinery of the brain provide a necessary and sufficient explanation of the totality both of the performance and of the conscious experience of a human being." Eccles found such an assumption unacceptable because the subject thus would be completely determined by cerebral events. It was Popper who finally persuaded Eccles to postulate his new hypothesis of the active and independent role of the "self-conscious mind" in its relations to the neuronal machinery of the brain.[5]

3. John C. Eccles, *The Human Mystery* (Berlin: Springer International, 1979), p. 213. All further references to Eccles refer to this book.

4. Charles Sherrington, *Man on His Nature* (London: Cambridge U. Press, 1940), p. 350. Unless stated otherwise, all subsequent references to Sherrington refer to this edition.

5. Eccles, p. 213.

The issue raised in the foregoing relates to the classical discussion on 'free will'. Is it possible for mental events to be, as Eccles writes, independent of the neuronal machinery? Is Eccles' hypothesis, as he asserts, in agreement with Sherrington's views? It is not. "If 'free will' means a series of events in which at some point the succeeding is not conditioned by reaction with the preceding, such an anomaly in the brain's series of events is scientifically unthinkable."[6,24]

Insofar as Eccles' opinions expounded in the biography of Sherrington are presented in two earlier publications, *The Self and Its Brain* by Popper and Eccles, 1977, and *The Human Mystery* by Eccles alone, 1979, it is necessary to refer to them for clarification of Eccles' ideas. His scientific eminence renders it appropriate to examine his theory, and his claim that it represents an extension of a dualistic concept at which Sir Charles Sherrington is said to have arrived.[7] I shall show that the theory of the "self-conscious mind" is untenable and that Eccles has misunderstood Sherrington's position.[23]

"SELF-CONSCIOUS MIND"

Despite the fact that, according to Eccles, the "self-conscious mind" whose existence he postulates, is an immaterial entity, it is said to establish an effective relationship with selected parts of the central nervous system to read out, remember experience, initiate recall from the cerebral data bank according to its interests and attention, and recognize numbers as correct or incorrect. The "self-conscious mind" continuously searches to recover memories, words, phrases, sentences, pictures, and melodies, scrutinizing the retrievals thus mobilized. "Like a searchlight," the "self-conscious mind" constantly scans the "liaison brain," including the speech areas and the prefrontal lobes. To some of its portions Eccles ascribes "transcendental properties."[8,24]

KORNHUBER, SPERRY AND LIBET[9]

In an attempt to prove the validity of his concept of the "self-conscious mind" Eccles cites three neurophysiological studies. He refers first to experiments by Kornhuber on electrical potentials generated in the cerebral cortex prior to the carrying out of a deliberate action. These experiments, Eccles writes, throw light on the problems of how the willing of a movement sets in train neuronal events that lead to the discharge of pyramidal cells of the motor cortex and so to activation of neuronal pathways that engender the muscle contraction. Kornhuber used the onset of muscle action potentials to trigger a reverse

6. Sherrington, p. 230.

7. John C. Eccles and William C. Gibson, *Sherrington: His Life and Thought* (Berlin: Springer International, 1979).

8. Eccles, p. 230.

9. Eccles, pp. 214-225.

computation of potentials preceding the onset of the movement. He thus obtained records of the electrical activity evoked at several sites over the precentral and parietal regions of the cerebral cortex. Kornhuber distinguished between "readiness-potentials" and "pre-motion positivity." The latter generate the motor potentials preceding pyramidal cell discharge that initiated the rapid flexion of the right index finger. Eccles believes that Kornhuber's observations exemplify the very wide influence of the "self-conscious mind" upon the pattern of operation of cortical cell aggregates. "The influence of the 'self-conscious mind' on the brain," he asserts, "is not of demanding strength." It nevertheless activates the entire brain, including subcortical structures, cerebellum, basal ganglia and thalamus, ensuring "that the movement will be well coordinated."

In a lecture to the Deutsche Gesellschaft für Neurologie in Wiesbaden on April 17, 1980, Kornhuber gave an unequivocal physiological explanation of the fact that electrical potentials are generated in the brain prior to the activation of the precentral motor cortex. "Cerebral neurons," he said, "fire before the neurons of the motor cortex fire during willed movements. In programming movements the cortex relies upon functional support from subcortical ganglia, ganglia of the brainstem and cerebellum." This statement is incompatible with Eccles' "dualistic interactionist hypothesis" according to which the entire brain is turned on by a non-corporeal "self-conscious mind." The difference between Kornhuber's and Eccles' accounts may at first sight seem small, but it is not. The former relies on fact, the latter on fancy.

Second, Eccles summarizes the studies conducted by Sperry with human subjects whose corpus callosum had been severed. He concurs in the opinion that the dominant cerebral hemisphere is specialized in respect to fine imaginative details amenable to verbal identification, and that the minor hemisphere cannot express itself in language. "It is not-talking, pre-eminent in respect of spatial abilities, with a strongly developed pictorial, sound and pattern sense." The dominant hemisphere can analyze and add and subtract and multiply and carry out a variety of computer-like operations derived from its verbal abilities and its liaison to consciousness. The dominant hemisphere is an arithmetical hemisphere, not a geometrical hemisphere. Eccles believes that these findings by Sperry are best explained with his theory of the "self-conscious mind."

The third observation to which Eccles attaches special significance in the context of his "dualist-interaction concept" was made by Libet, who noted a delay in the neuronal events that trigger conscious experience following stimulation of peripheral skin. "The experience itself is actually judged by the subject to be earlier, at about the time of cortical arrival of the afferent input." The ante-dating, Eccles writes, "is not explicable by any neurophysiological process per se." Presumably it is a "strategy that has been learned by the 'self-conscious mind' which has the ability to make slight temporal adjustments, i.e., to play tricks with time."

SHERRINGTON'S POSITION

"Finite mind," Sherrington writes, "is always observed to be embodied mind." Concerning the "how" of the attachment of mind to the body, Sherrington recalls Galen's views according to which spirits work the mind as well as the body, an assertion he finds unacceptable. "They confounded two incommensurable things," in that "the concept of energy is adequate to deal with all that is known to knowledge, except mind." Sherrington goes on to say that the various and different species of bodies embodying finite mind invariably tally with their specific bodies. "The ox-mind in agreement with the ox-body, the tiger-mind with the tiger body, the monkey-mind with its body, and man's mind with his."[10] Thus, a special element of unity of seemingly irreconcilable entities reveals itself, a unity that extends also to "the attachment of mind to the motor act." This attachment, Sherrington says, bestows upon the motor act a temporal relationship. "It imbues it with purpose. The act puts forth as it were a little bud into futurity; also there is lent to it a something of the past. The motor act is set as between a future and a past."[11]

In 1975 Wilder Penfield, the Montreal neurosurgeon, presented evidence* that added to the understanding of the "temporal relationship of the motor act" of which Sherrington wrote. Penfield gave a description of epileptic discharges originating in the higher brain stem that render the individual a mindless automaton. He is unconscious, yet still functions as a motor unit, continues to carry out "whatever purpose his mind was in the act of handing on to his automatic sensory-motor mechanism." One of Penfield's patients was a pianist. When a seizure started he made a slight interruption in his practicing which his mother recognized as the beginning of an 'absence' but continued to play for a time with considerable dexterity. He subsequently had complete amnesia for the period of the epileptic discharge during which "the temporal relationship of the motor act" was suspended.

In a memorable passage Sherrington refers to the problem whose interpretation, Eccles believes, caused Sherrington to accept a dualist position: "In the energy-pattern which is the brain, two sets of events happen such as, to human knowledge, happen nowhere else the perceptible universe over. In that universe, sampling it, standing where we do on our planet's side, ourselves compact of energy, nowhere does our glimpse detect in all the immensity of energy any relation of energy except to energy, save in this one instance, the brain."[12] Energy, Sherrington writes, is the medium of liaison between mind and mind. "The isolation of finite mind from finite mind is thus overcome, indirectly

10. Sherrington, p. 167.

11. Sherrington, p. 205.

12. Sherrington, pp. 260-261.

*Wilder Penfield, *The Mystery of the Mind* (Princeton: Princeton U. Press, 1975), p. 39.

and by energy. Speech, to instance a detail, illustrates this indirect liaison by means of energy between finite mind and finite mind. I have seen the question asked, Why should mind have a body? The answer may well run, to mediate between it and other mind."[13]

There is yet another kind of distinction between energy and mind. "Energy is indestructible and that it is so natural science finds, in so far, demonstrable. But mind seems to come from nothing and to return to nothing. The devolution into nothing seems as difficult to accept as the evolution out of nothing."[14] However, at no time does Sherrington take recourse to theories that do not fit into the conceptional framework of the natural sciences. In contrast to Eccles, Sherrington accepts the fact that no explanation is possible for the juxtaposition of the insubstantiability of mind and the substantiability of its mechanism of communication. "Spoken words are energy, thoughts are not."[15] That the mental is not examinable as a form of energy, Sherrington observes, "is the gap which parts psychiatry and physiology."[16]

Again and again, Sherrington stresses that the mental has no place in the physical world: "Mind, for anything perception can compass, goes in our spatial world more ghostly than a ghost. Invisible, intangible, it is a thing not even of outline; it is not a 'thing'. It remains without sensual confirmation, and remains without it forever." Of the physical, Sherrington finds an equally felicitous description: The energy concept encompasses the perceptible world, "a category which nothing which does not act on sense can enter and which all that does so act does enter."[17]

Of Sherrington's book, *Man on His Nature,* Ragnar Granit writes that its inspiration is the image of the world that modern science is creating, justifying the belief that we can understand Nature in terms which are satisfying to ourselves.[18] Sherrington interprets the story of evolution as proving that living things are busy becoming something other than what they are all the time, and that mind was no exception. "It is part of the tide of change." Granit calls Sherrington's attitude "one of evolutionary monism"; it draws no line between life and lifeless. In life's history of two thousand million years, mind, according to Sherrington, has emerged in the general development of cell aggregates into bodies with brains. "The appearance of recognizable mind in the soma would then be not a creation *de novo* but a development of mind from unrecognizable into recognizable." Sherrington's position must not be confused with the dualism

13. Sherrington, p. 261.

14. Sherrington, p. 267.

15. Sherrington, p. 269.

16. Sherrington, p. 289.

17. Sherrington, p. 357.

18. Ragnar Granit, *Charles Scott Sherrington: A Biography of the Neurophysiologist* (New York: Doubleday & Co., 1967), pp. 166 and 172.

of theology. Mind, he says, looks at our world "by its own unaided vision." However, his view has in common with traditional religion the realization that there is a need to resort to metaphor where our knowledge halts. Sherrington's metaphors are integral parts of his story just as the metaphors in the Bible are integral parts of its story. Fernel's juxtaposition of "the theater of event" and "the event itself" fits perfectly into Sherrington's narration, including the French philosopher's analogy that geography is the theater for history, and anatomy the theater for medicine; while Sherrington's symbolic interpretation of the terms "tenement" and "tenant" illustrates his concept of the unity of the two incommensurables — energy and mind.[19]

"MIND AND ENERGY ARE MERELY CONCEPTS"

I wrote above that Eccles misunderstood Sherrington's position. The concept of dualism to which Eccles subscribes is in fact the opposite of what Sherrington came to believe. The two following quotations speak for themselves. The first is the concluding paragraph of chapter XI of *Man on His Nature:*

> Between these two, naked mind and the perceived world, is there then nothing in common? Together they make up the sum total for us; they are all we have. We called them disparate and incommensurable. Are they then absolutely apart? Can they in no wise be linked together? They have this in common — we have already recognized it — they are both concepts; they both of them are parts of knowledge of one mind. They are thus therefore distinguished, but are not sundered. Nature in evolving us makes them two parts of the knowledge of one mind and that one mind our own. We are the tie between them. Perhaps we exist for that.[20]

The final quotation is taken from the introduction to the second edition of *The Integrative Action of the Nervous System,* written by Sherrington in 1947, at the age of ninety:

> Each waking day is a stage dominated for good or ill, in comedy, farce or tragedy, by a dramatis persona, the 'self'. And so it will be until the curtain drops. This self is a unity. The continuity of its presence in time, sometimes hardly broken by sleep, its inalienable 'interiority' in sensual space, its consistency of viewpoint, the privacy of its experience, combine to give it status as a unique existence. Although multiple aspects characterize it, it has self-cohesion. It regards itself as one, others treat it as one. It is addressed as one, by a name of which it answers. The Law and the State schedule it as one. It and they identify it with a body which is considered by it and them to belong to it integrally. In short, unchallenged and unargued conviction assumes it to be one. The logic of grammar endorses this by a pronoun in the singular. All its diversity is merged in oneness.[21]

The core of my argument is that a distinction must be made between

19. Sherrington, pp. 38, 209.

20. Sherrington, p. 357.

21. Charles Sherrington, *The Integrative Action of the Nervous System* (London: Cambridge U. Press, 1947), Foreword, p. xviii.

Sherrington's axiom according to which mental events do not fit into the conceptual framework of the natural sciences and Eccles' claim that a separate entity, 'the self-conscious mind', operates the brain, and that it does so outside the laws of physics. Such amplification of the mind-concept "may be legitimate for a revealed religion," Sherrington wrote in reference to a similar claim made two millennia ago by the Roman poet Lucretius. But as an assertion on the plane of Natural Religion, Sherrington posited, it is an irrational blow at the solidarity of the individual; it seems aimed against the very harmony which unites the concept of energy and mind as sister-concepts. "It severs them and drives off one of them, lonely enough, on a flight in to the rainbow's end."[25,26*]

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22. 150 years ago, Heinrich Heine commented on a similar dualistic concept proposed by the German philosopher Fichte who considered mind to be 'an immaterial entity capable of observing a mental event as from a distance.' Such an idea, Heine wrote, reminded him of the story of the monkey who put his tale into a pot of boiling stew because, he explained, 'the true art of cooking consists not only of the process of cooking but also of its subjective experience.' (Heinrich Heine, *Zur Geschichte der Religion und Philosophie in Deutschland* [Hamburg: Hoffman und Campe, 1835].)

23. Eccles' claim that "the general theme of Sherrington's book is the dualism of man's nature, body and mind" (*H.M.* p. 2) is unfounded. On p. 185 of *Man on His Nature* Sherrington leaves no doubt as to his opposite view: "The course of scientific discovery has conspired with the view of Descartes to cut the individual into two disparate halves, mind and body. That severance is pronounced a paradox by Nature and by Evolution. Nature and Evolution deal with the individual, body and mind together as a unity."

24. Eccles imagines that an immaterial "self conscious mind" communicates with the material brain through "small crevices," a fanciful concept reminiscent of René Descartes' assertion made more than three centuries ago that an insubstantial "res cogitans" communicates with the substantial "res extensa." The two meet, so he postulated, in the pineal gland "which acts as a valve that controls the passage of animal spirits between forward and hindward chambers of the brain." Like Eccles, Descartes was a dualist. "The human mind," he said, "is a thinking substance, *toto coelo* different from any 'extended substances' " such as the human body. Professor Abraham Wolf writes that according to Descartes the "res cogitans" "is of such subtle kind that it is on the verge of ceasing to be material" (*Encyclopedia Britannica*, 1953 Edition, 7:252).

Descartes' theories were severely criticized by Benedict Spinoza whose statement assumes fresh significance in the context of Eccles' recent claims: "I would fain be told how many degrees of movement the mind can give to this little pineal gland, and with what force it can lift it. I feel surprise that so great a man and philosopher, one who has laid it down as his rule to draw conclusions only such as are self-evident and to assert nothing of which he has not a clear and distinct perception, he who so often has reproached scholasticism with explaining the obscure by qualities which are occult, allows himself an hypothesis more occult than all the occult qualities put together (See Sherrington, *Man on His Nature*, p. 349)."

25. In 1980 Eccles published yet another book, *The Human Psyche* (Berlin: Springer International). Most of the material it contains is taken from the author's previous writings, much of it verbatim. The illustrations are virtually the same as those in his earlier contributions. A significant feature of the new opus is the assertion made on p. 21 and p. 243 that Eccles' theory according to which "a fundamental tenet of physics" does not apply to the operation of "the self conscious mind" need not to be in conflict with the first law of thermodynamics. No explanation is offered as to how the two statements can be reconciled.

On p. 50 Eccles concedes that "brain events provide no explanation of our commonest experience" — yet, commonest experience is what his book is primarily concerned with. It is all the more appropriate to point out that the excellence of Eccles' description of brain events marks all his writings as extraordinarily valuable. Models of didactic perfection are chapters 3, 4, and 6 of the new book, dealing with "Sensory Perception and Illusion," "Electrical Responses of the Brain" and "Brain Activity and Levels of Consciousness." However, none of them have any bearing upon the author's "dualist interaction theory" according to which "psyche exists as an independent entity" that operates unencumbered by the laws of physics in that it "selects from modular patterns," "extracts meaning from memory traces" which it "reads out in accord with its interests."

On p. 196 Eccles severely criticizes D.L. Wilson's book, *Sociobiology, a Modern Synthesis* (Cambridge, Mass.: Harvard University Press, 1975), writing as follows: "We are overwhelmed by the scholarship and excellence of the description and illustrations....However, (I have) reservations about the way in which these observations ... are used to support dogmatic statements in the field of psychology and ethics."

26. Sherrington, p. 354.

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*The reviewer acknowledges with thanks the assistance of Hilda B. Saunders in the preparation of the manuscript.

FIVE MAJOR BOOKS ON SHERRINGTON

Lord Cohen of Birkenhead, *Sherrington, Physiologist, Philosopher and Poet* (Springfield, Illinois: Charles C. Thomas, 1958).

E.G.T. Liddell, *The Discovery of Reflexes* (Oxford: Clarendon Press, 1960).

Ragnar Granit, *Charles Scott Sherrington: A Biography of the Neurophysiologist* (Garden City, N.Y.: Doubleday and Co., 1967).

Judith P. Swayzey, *Reflexes and Motor Integration: Sherrington's Concept of Integrative Action* (Cambridge, Mass.: Harvard University Press, 1969).

John C. Eccles and William C. Gibson, *Sherrington: His Life and Thought* (Berlin: Springer International, 1979).

Biographical Source Material on Sherrington and Eccles:

Nobel Lectures in Physiology or Medicine 1922-1941 (Amsterdam, London, N.Y.: Elsevier Publishing Company, 1965), pp. 290-292.

Nobel Lectures in Physiology or Medicine 1963-1970 (Amsterdam, London, N.Y.: Elsevier Publishing Company, 1972), pp. 28-31.

In the following four books Sherrington presented his neurological and philosophical position:

The Brain and Its Mechanism (London: Cambridge University Press, 1937).

Man on His Nature (London: Cambridge University Press, 1940).

The Integrative Action of the Nervous System (London: Cambridge University Press, 1947), introduction.

The Endeavour of Jean Fernel (London: Cambridge University Press, 1946).

Eccles' references to the work of Kornhuber, Sperry and Libet are as follows:

Kornhuber, H. H. 1973. Neural control of input into long term memory: limbic system and amnestic syndrome in man. In *Memory and Transfer of Information*, ed. H.P. Zippel, pp. 1-22. New York: Plenum Press. [194, 195, 197, 201]

Kornhuber, H. H. 1974. Cerebral cortex cerebellum and basal ganglia: an introduction to their motor functions. In *The Neurosciences: Third Study Program,* eds. F.O. Schmitt, and F.G. Worden, pp. 267-280. Cambridge, Mass.: MIT Press. [214, 215]

Sperry, R. W. 1974. Lateral specialization in the surgically separated hemispheres. In *The Neurosciences: Third Study Program,* eds. F.O. Schmitt and F.G. Worden, pp. 5-19. Cambridge, Mass.: MIT Press. [218, 219, 234]

Libet, B. 1973. Electrical stimulation of cortex in human subjects, and conscious memory aspects. In *Handbook of Sensory Physiology,* ed. A. Iggo, 2:743-790. Berlin, Heidelberg, New York: Springer. [225]

Libet, B., Kobayashi, H., and Tanaka, T. 1975. Synaptic coupling into the production and storage of a neuronal memory trace. *Nature* 258:155-157. [202]

Memoir of M. Prince Brigham (1923-1980)

GEORGE P. ROSEMOND, M.D.

M. PRINCE Brigham was truly a successful man who demonstrated through the years the fine characteristics significant of his name. His success, not measured in material wealth, was infinitely varied. Devoted husband, father and friend to a thoughtful and loving family, he possessed that rare innate compassion and ability to relate with ease to his fellow man. This natural talent continued to develop until it became a finely tuned instrument which was used wholeheartedly in his long and intimate relationship with students and faculty at the Temple University Health Sciences Center. His generous spirit was conducive to friendship and his friends were legion. Never solicitous, he earned the respect and love of his fellows by example and accomplishment.

Doctor Brigham was born in Birmingham, Alabama on August 6, 1923. He received a B. S. degree from the University of Miami in 1944, an M. S. degree (Neuro-anatomy and Biochemistry) from Cornell University in 1946, and an M.D. degree from the Temple University School of Medicine in 1950. He served his internship and residency in general surgery at Temple.

From 1956 to 1958, Doctor Brigham was a captain in the United States Army Medical Corps and spent most of that time overseas. Following that service, he was guest investigator at the Rockefeller Institute in New York City from 1958 to 1959.

In 1959, Doctor Brigham returned to Temple as a member of the surgical faculty and Director of Surgical Research. From the very onset he was recognized as a competent surgeon and skillful teacher. His elective course in animal surgery was always oversubscribed.

In addition to his many duties, it soon became evident that Doctor Brigham was the father confessor to the members of the surgical department, the secretarial staff and numerous students. His sense of humor, self-effacement, ability to listen and to understand were natural assets.

When the position of Assistant Dean in Charge of Student Affairs became vacant in 1967, Doctor Brigham was the obvious choice. Clearly, from the beginning he was a signal success in a lusterless assignment. In 1973, he was named Associate Dean and served as Acting Dean from January to September, 1979.

During the last several years of his life, Doctor Brigham was aware that he suffered from an invariably fatal disease. In spite of this there was no change in his efficiency and attitude toward others, and the Temple University School of Medicine in its entirety continued to be family to him. Three weeks before he died

he was observed in his hospital bed busily dictating to his secretary.

Doctor Brigham was an active member of numerous medical organizations including the College of Physicians of Philadelphia. He was also extremely active in his church.

He was a man without bias. Gifted in seeing the total person, the underprivileged attracted his special attention. Doctor Brigham was instrumental in stimulating unusual initiative in the handicapped. He sponsored the first blind student to graduate from medical school in over one hundred years, and encouraged the potential in this particular man, an excellent student, when others had passed him by.

Doctor Brigham's interest in the student did not abate with medical school admission, nor did his nature wane. He was a willing advisor who cheerfully accepted the problems of the students as well as those of his faculty colleagues. Examples of his salutary effect on individual students are too numerous to cite. I quote one student: "From his days of greeting us during orientation he was the one person we all knew we could turn to at any time of day or night. In an institution where depersonalization could have come so easily, he made Temple University School of Medicine a family. Doctor Brigham never lost sight of the individual. He treated us as people first, not professionals." A long-time research laboratory associate states: "Talking to Doctor Brigham when he was inspired could change one's whole life. He was always generous and understanding."

Appreciation of this distinct gentleman was demonstrated by the student body honoring him with the Golden Apple Teaching Award, and again in 1977 when the Temple University School of Medicine Yearbook was dedicated to him.

Doctor Brigham is survived by his wife, Elizabeth (Betty) Parkinson Brigham, five children: Timothy, Mark, Susan, Lauren and David, and a brother, Mario Suriani, of New York City. Mark Brigham is a student at the Temple University School of Medicine.

Doctor Brigham's was a life of service. He gave unstintingly of his wisdom and knowledge, enriching countless lives and lighting anew the torch of medicine to be carried into future generations.

Memoir of Robert John Hunter (1882-1980)

SAMUEL X RADBILL, M.D.

WHENEVER the name of Dr. Robert J. Hunter was mentioned, the Philadelphia General Hospital came to mind at once. For years he was the ardent champion of that institution's claim to historic priority. His whole medical life was centered around Blockley. After receiving his M.D. degree from the Medico-Chirurgical College of Philadelphia in 1904, he obtained his license to practice that same year. Even though internship was not then required to practice, he spent the next two years at the Philadelphia General Hospital as a resident, for the hospital was famous in the annals of American medicine for the high caliber of its training. In 1914 he was appointed laryngologist to the tuberculosis department and in 1920 laryngologist to the general hospital staff. In 1932 the hospital celebrated its bicentennial at which time he prepared a history of the institution, tracing its origin back to the enabling ordinance of 1712 and the construction of the first buildings in 1731-32 (*Pennsylvania Magazine of History and Biography* 57[1933]:32-57). The same year he read a paper to the American Philosophical Society (April 22, 1932) in which he went into further detail about the activities of members of that Society during the early days of the hospital (*Proceedings of the American Philosophical Society* 71[1932]:309-19). In 1934 the William Osler Memorial Building at the Philadelphia General Hospital was dedicated. This was the old "post house" — favorite workshop of Osler during his term of service at Blockley which the city fathers pledged their word of honor would be preserved. Like some other familiar pious political promises, this promise lasted only as long as Dr. Hunter was personally able to devote his energies to its welfare. Once age interfered with his protective efforts, the memorial fell victim to the voracious maw of academic progress. Addressing the Training School for Nurses at Philadelphia General Hospital at the 50th anniversary celebration of the school in 1934, Dr. Hunter predicted the venerable institution would go on for many more centuries because of the bases of its origin—compassion for the sick and charity for the poor— were fundamental characteristics of a civilized society. Little did he expect that government would outlaw benevolence and displace compassion with cold calculating comforts of bureaucratic right to health care. This great world-reowned institution grew in stature through nearly a quarter of a millennium. In 1977 it suddenly collapsed when charity and compassion gave way to the demands for medical care as a right. The age-old spirit of the physician dedicated to the service of the sick and poor and to the training of disciples in the Hippocratic tradition was destroyed by the monstrous, mounting costs of third party payment.

In 1963 Dr. Hunter had to reluctantly resign as chairman of the Blockley Memorials Committee and Osler Museum Committee on account of his wife's health. About the time of the hospital's bicentennial celebration he had rescued many of the old books that had been accumulated through the years by means of medical student lecture fees to form the library of the Philadelphia Almshouse. Since the library was to be revitalized, these rare old volumes were about to be destroyed. Dr. Hunter solicitously gathered them up along with old hospital archives and placed them into protective custody in the Osler Museum. When the hospital was abandoned, the archives were sent to the city archivist and the books were turned over to the College of Physicians of Philadelphia.

In addition to his work at the Philadelphia General Hospital, Dr. Hunter conducted the hearing center of the Hospital of the University of Pennsylvania. He was certified by the American Board of Otolaryngology, a member of the American Academy of Ophthalmology and Otolaryngology, the American Otological Society, the Philadelphia County Medical Society, the Pennsylvania State Medical Society, the American Medical Association, the Historical Society of Pennsylvania, the Philadelphia City History Society, and many other organizations. He was elected a Fellow of the College of Physicians of Philadelphia in 1921.

During World War I he was a captain in the U.S. Army Medical Reserve Corps and assigned to the Army Air Corps where he was the first army flight surgeon in this country. His World War I uniform is therefore on display at the Randolph Field Museum of Aviation Medicine in Texas. In 1939 he was commissioned a lieutenant commander in the U.S. Naval Reserve and served as commanding officer of the Philadelphia General Hospital Medical Unit. When World War II broke out he went back into active duty in the Navy Medical Corps. Thus, he served in both world wars and in the Army, Air Force and Navy.

He is survived by his wife, the former Helen North, and two daughters, Miss H. Virginia Hunter and Mrs. Arthur L. (Laura) Colwin.

ANNOUNCEMENT

The Francis C. Wood Institute of the College of Physicians of Philadelphia announces the availability of a number of small research grants. Funds will be available between July 1981 and June 1982. Awards will be made on the basis of need and will not exceed $5,000. The grant program is intended to assist scholars pursuing research in medical history and contemporary medical issues in historical perspective. The Wood Institute offers these grants in order to make available the resources of the library of the College of Physicians and to provide for the publication of selected research findings in *Transactions & Studies of the College of Physicians* in its new series *Medicine and History*.

Letters of application should be addressed to:

Ronald F. Kotrc, Director
Francis C. Wood Institute
College of Physicians of Philadelphia
19 South 22nd Street
Philadelphia, PA 19103

Applications must be received by February 15, 1981.

Some Lost, Obsolete, or Discontinued Diseases: Serous Apoplexy, Incubus, and Retrocedent Ailments*

SAUL JARCHO

THE general concept of disease and the concept of individual diseases are obviously basic to the work of the medical practitioner but have not received the extensive or intensive study that is warranted by their importance. Without plunging into the philosophical morass of realism versus nominalism,[3] I shall use a simple working hypothesis, *viz.* that any individual disease such as typhoid fever is an *abstraction* formed by collecting the deviations encountered in a series of individual persons and by summating the deviations which these individuals have in common. In the example of typhoid fever these common deviations include continued fever, mental depression, rose spots, splenomegaly, ileal ulceration, and the presence of the typhoid bacillus. From these we create the abstraction known as typhoid fever.

Abstractions of this kind are indispensable tools in medical practice. Like other tools, they may be modified. For example, after the concept of typhoid fever was established and accepted, new clinical, bacteriological, and epidemiological facts made it necessary to split off paratyphoid fever as a separate abstraction.[4]

Medical abstractions may also vanish into obsolescence.[5] It is this category—

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*The Clendening Lecture, delivered at the University of Kansas Health Center, April 5, 1980.

Author's Note: In offering a discussion of lost, obsolete, and discontinued diseases, I have the pleasure of setting before the colleagues, students, and other friends of Dr. Robert P. Hudson some new materials on a subject which he has discussed in at least two published writings.[1,2] Thus there is eminent precedent for what is now presented. Further, I hope that my essay will be regarded as being in the tradition exemplified and honored by the scholarly contributions of Dr. Logan Clendening.

1. R. P. Hudson, "How Diseases Birth and Die," *Transactions and Studies, College of Physicians of Phila.* 45 (1977): 18-27.

2. R. P. Hudson, "The Biography of Disease: Lessons from Chlorosis," *Bull. Hist. Med.* 51 (1977): 448-463.

3. For a recent discussion of these and related views see F. K. Taylor, *The Concepts of Illness, Disease and Morbus* (Cambridge: Cambridge University Press, 1979).

4. See S. Jarcho, "Discussion on the History of Yellow Fever," in *Time, Place and Persons: A Symposium on the History of Epidemiology,* ed. by Abraham Lilienfeld (Baltimore: Johns Hopkins University Press, in press).

5. See, for example, M. M. Weissman, "The Myth of Involutional Melancholia," *J.A.M.A* 242 (1979): 742-744.

the category of the obsolete—that I have chosen for discussion, since it offers special insight into processes of medical thought. Let us begin with a now-forgotten disease called serous apoplexy, which lasted approximately from the second century to the nineteenth.

I
Serous Apoplexy

The ancient Greeks believed that sudden paralysis, especially when it affected half of the body and was preceded by unconsciousness, was caused by thick fluid which obstructed the cerebral ventricles and the origins of nerves. The statement has been made by more than one scholar that in this process Hippocrates implicated phlegm as the causative material. Jean de Gorris (1505-77), an obscure lexicographer, says:

> Apoplexia is an obstruction of the common origin of nerves; it suddenly removes sensation and movement from all parts of the body and impairs the chief actions. Its sudden attack signifies that a cold, thick, or sticky fluid is blocking the main ventricles of the brain, but it is not produced by a sudden dyscrasia of the brain's entire substance. Its sole cause is a vicious humor [harmful fluid] halting in the brain, without putridity or fever. It is chiefly a phlegmatic but sometimes a melancholic fluid, which Hippocrates discussed in the *Aphorisms*...[6]

The author of a relatively recent history of medicine refers to the Hippocratic theory of paralysis as cerebral defluxion of blood or phlegm.[7] I think that both this statement and the statement of De Gorris are inexact.

As must be expected in a variegated collection written by different authors over a span of one or more centuries, the Hippocratic writings provide varied opinions; this applies, *inter alia,* to the cause of apoplexy. One treatise, for example, attributes the disease to wind.[8] Much commoner in the Hippocratic corpus is the attribution to black bile moving in the head. This explanation appears in the *Aphorisms*.[9] The same treatise also attributes sudden paralysis to black bile:

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6. J. De Gorris [Gorraeus], *Definitiones medicarum libri XXIIII* (Frankfurt-am-Main: Wechel, 1578), p. 46. This and all subsequent translations in the present essay are by S. J. unless otherwise noted.

7. C. Mettler, *History of Medicine* (Philadelphia: Blakiston, 1947), p. 537. This is a minor inadvertence in a large and useful book.

8. See *Breaths (Peri Physon, de Flatibus)*, sect. 13; Littré VI 111. This form will be used for references to *Oeuvres completes d'Hippocrate*, ed. E. Littré, 10 vols. (Paris: Bailliere, 1839-1861).

Of *Breaths (de Flatibus)* W. H. S. Jones remarks that "the author shows no genuine interest in medicine, nor do his contentions manifest any serious study of physiology or pathology." Hippocrates, *Works* (London: Heinemann [Loeb Classical Library], 1923) 2:222.

9. *Aphorisms* VI. 56. Littré IV. 579 renders this as "Dans les maladies mélancoliques, les deplacements [de l'atrabile] font craindre les maladies de ce genre: l'apoplexie, le spasme, la folie, la cécite." A slightly different version is given by W. H. S. Jones in the Loeb Library edition, 4:193: "In melancholic affections the melancholy humour is likely to be determined in the following ways: apoplexy of the whole body, convulsions, madness or blindness."

> If the tongue suddenly becomes powerless, or any other part of the body is paralyzed, it is a sign of black bile.[10]

A similarly atrabilious explanation of apoplexy occurs in *De Morbis II.* This text says that symptoms occur when black bile, moving in the head, begins to flow, especially to a place where there are many veins, that is, to the neck and the chest.[11] None of these Hippocratic passages implicates blood. The explanations are hypotheses or guesses, advanced in an attempt to explain clinical facts, but are not buttressed by corroborative evidence.

It was not the laconic Hippocrates but the verbose Galen[12] who codified and determined the concept that was to be dominant until the nineteenth century. Galen says that apoplexy is paralysis of the whole body, accompanied by impairment of its main functions.[13] He elsewhere adds that when all the nerves alike have lost sensation and movement, the disease is called apoplexy.[14] With respect to the cause and pathogenesis of apoplexy, as on other subjects, his statements are numerous but not fully concordant. He makes the general remark that apoplexy is produced by an abundance of thick humors which obstruct the vessels of the head from which the faculties of sensation and movement are derived.[15] At one point he says that apoplexies occurring in the course of fevers come from an excess of blood suddenly oppressing the source of life;[16] this apparently is the only passage in which he attributes apoplexy to blood. In most Galenic discussions the cause is said to be obstruction by a thick fluid, not blood but either phlegm or black bile. The following examples reveal the diversity and inconsistency of Galen's utterances:

> All apoplexies are produced because the animal faculty cannot flow to structures below the head, either on account of some inflammatory disease that exists in the head or because the [cerebral] ventricles are stuffed with phlegmatic fluid.[17]
>
> ...apoplexies and epilepsies seem to come from an abundance of phlegmatic fluid that has collected in the ventricles of the brain itself.[18]

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10. *Aphorisms* VII. 40; Littré IV. 589.
11. *De Morbis II,* sect. 6. Littré VII. 15.
12. It is almost mandatory to overlook the puzzling discussion by Celsus (*De Medicina* III. 27), which contains obscurities discussed in detail by Morgagni (*De Sedibus* II. 2). Celsus, interested in nomenclature, clinical course, and treatment, makes no mention of humoral causes.
13. C. G. Kühn, *Claudii Galeni Opera Omnia.* Leipzig, 1821-1833, 20 vols, in 22. Facsimile (Hildesheim: Olms, 1964) Hereinafter cited as K. See K VII. 59.
14. K. VIII. 208.
15. K XIV. 737.
16. K XI. 265.
17. K XVII B. 541-542.
18. K VII. 201.

> Apoplexy, convulsions, and blindness are caused by a phlegmatic fluid; they also are caused by an atrabilious one.[19]
>
> Vertigo and sicknesses of the head occur as a sequel, as do apoplexies, for the latter disease occurs when the head is filled with phlegm.[20]
>
> ...epilepsies and apoplexies are phlegmatic diseases.[21]

The Galenic belief that apoplexy is caused by phlegm or black bile obstructing the cerebral ventricles and nerves was to maintain general dominance or predominance for centuries. In a manner not clearly identified by historians—and perhaps not clearly identifiable[22]—blood was added to the list of culpable fluids. Here we may note the difference between the statement of Aetius, who lived in the sixth century of the Christian era and that of Avicenna, who died about A.D. 1037. Aetius, in a chapter based on Galen, says, less precisely than his model, that apoplexy shows that a thick or cold or sticky fluid fills the major cerebral ventricles, and that the disease is not due to total cerebral dyscrasia. He adds, wisely, that the magnitude of the danger can be guessed from the magnitude of the damage to respiration.[23]

In contrast, Avicenna, the prototype of medieval medicine, says:

> ...either it is a bloody fluid poured out suddenly into the cerebral ventricles or it is a phlegmatic fluid, and it is mostly the latter.[24]

Let us now skip six centuries. In 1658, J. J. Wepfer published his *Anatomical Observations on the Cadavers of Persons Carried off by Apoplexy.*[25] This work not only demonstrated the relation between apoplexy and cerebral hemorrhage, it gave to the entire subject the support of solid anatomical knowledge, and it demonstrated the value of a *series* of cases. While Wepfer is universally and properly given credit for his achievements, commentators have usually overlooked the inconvenient fact that he found hemorrhage in only three of his famous four cases.

The fourth case of so-called apoplexy was that of a man who labored in the vineyards and drank the wine thereof. For several weeks he had had a severe headache. Then he became blind. Later he had jactitation and urinary incontinence. Four days before death he developed what was called apoplexy, i.e.,

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19. K. XVIII A. 95.
20. K XVII B. 626.
21. K XVII B. 602.
22. Some early references are given by Morgagni in *De Sedibus* II. 7.
23. *Aetii Medici Graeci Contractae ex Veteribus Medicinae Tetrabiblos* (Basel, Froben, 1542). Book II, chap. XXVII.
24. Avicenna, *Canon*, book III, fen I, treatise V, chap. 12.
25. J. J. Wepfer, *Observationes Anatomicae ex Cadaveribus Eorum Quos Sustulit Apoplexia* (Schaffhausen: Suterus, 1658). I have used the edition published in 1675.

he was senseless, motionless, and unresponsive to stimuli. At autopsy a pallid yellowish fluid was found, mainly between the dura and pia. It depressed the cerebrum and cerebellum and it flowed out when the brain was incised. There was gelatinous matter in the sulci. Wepfer commented, "And so I do not fear to call this a dropsy of the brain and some kind of hydrocephalus."

As was to be expected, Wepfer's contribution came to be reflected in works of reference. Stephanus Blancardus wrote the following in his *Lexicon Medicum:*

> Apoplexy, thunderstruck stupor, sideration, and thunderstruck disease, is abnormal somnolence in which patients who are strongly shaken or agitated or pricked feel nothing or give no signs of what has been done.... It often comes from thick blood which blocks the small channels in the brain... or from blood abnormally effused about the base of the brain, pressing and squeezing the carotid arteries or the brain, or from lymph or serum extravasated in the brain... German, *der Schlag*.[26]

It will be noted that Blancardus mentions blood first in the list of culpable fluids; he gives less prominence to lymph and serum but does not omit them.

The clarification afforded by Wepfer's investigations was important but proved to be less than complete. Hermannus Boerhaave, the great eighteenth-century physician and teacher, wrote as follows:

> From the same source [autopsy preceded by clinical observation] it is evident that this disease often comes from varied and even opposite causes. Hence it can well be divided into bloody and phlegmatic. But this division is not perfect, since there is also a serous, an atrabilious, and a polypous [blood-clot] variety, and others.[27]

This pronouncement shows that the ancient humoral causes had not yet been dismissed. Since numerous autopsies were on record by Boerhaave's time, it must be inferred that the anatomical findings made in cases of apoplexy were being interpreted according to the causes—partly observational and partly traditional—which he enumerated.

After the work of Wepfer the next major study of apoplexy is that which Giambattista Morgagni included in his immortal treatise *On the Seats and Causes of Diseases Investigated by Anatomy*.[28] This book inquires into the anatomical locus of symptoms, the discussion being presented in long letters, arranged in the ancient order, *a capite ad calcem*. In Book I there are four letters that bear upon the present discussion, *viz.*, Letter II, "Of the apoplexy in general, and particularly of the sanguineous apoplexy," Letter III, "Of the same sanguineous apoplexy,"

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26. S. Blancardus, *Lexicon Medicum*. Jena, 1683; facsimile, with introduction by K. H. Weimann (Hildesheim: Olms, 1973), 41.

27. H. Boerhaave, *Aphorismi de Cognoscendis et Curandis Morbis* (Venice: Basilius, 1757) 244, paragr. 1012.

28. J. B. Morgagni, *De Sedibus et Causis Morborum per Anatomen Indagatis* (Venice: Remondini, 1761). Quotations are from the translation of Benjamin Alexander, London, 1769; facsimile, with preface by Paul Klemperer (New York: Hafner, 1960) 3 vols.

Letter IV, "Of the serous apoplexy," and Letter V, "Of the apoplexy which is neither sanguineous nor serous." I shall omit from consideration Letter XI, "Of palsy," which shows mainly that the cerebral lesion was contralateral to the paralysis. Morgagni was greatly concerned to give credit to Valsalva for priority in this matter, whereas the clinical facts were clearly stated by Aretaeus[29] in the second or third century of the Christian era. Eager students may feel impelled to compare the Aretaean presentation with the "near miss," a case of possible contrecoup (?) that is described in the Edwin Smith papyrus.[30]

The four letters in the *De Sedibus* that deal with sanguineous apoplexy, serous apoplexy, and indeterminate cases of apoplexy require careful examination, especially since Morgagni's discussion is detailed and systematic and his presentation of serous apoplexy is the most extensive that has come to light.

Letters II, III, IV, and V, on sanguineous, serous, and indeterminate apoplexy contain 122 long articles or paragraphs and run to 104 large quarto pages in Alexander's translation. Under each subject Morgagni, after preliminary summary of the literature, describes autopsied cases taken, with proper acknowledgment, from the files of his teacher Valsalva,[31] and these he supplements with cases of his own. The letters on sanguineous and serous apoplexy, prepared in this way, contain a total of forty autopsied cases. I have summarized the data in the accompanying table.

Among the forty cases there are eleven in which the clinical history was absent or grossly inadequate, e.g., cases in which a person was found dead or died instantly, so that significant observations could not be made. The subtraction of these eleven leaves twenty-nine suitable for analysis. In the fourteen acceptable cases in which sanguineous apoplexy is thought to have been present, paralysis—hemiplegia, monoplegia, or cranial palsies—occurred in twelve and somnolence or coma was noted in four. Blood was found in the brain, ventricles, or meninges in thirteen, encephalomalacia or "ulcerative" lesions of the brain occurred in six.

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29. Aretaeus, "On the Causes and Symptoms of Chronic Diseases," 1.7, in *The Extant Works of Aretaeus, the Cappadocian*, ed. and trans. Francis Adams (London: Sydenham Society, 1856), p. 306.

30. J. H. Breasted, *The Edwin Smith Surgical Papyrus* (Chicago: University of Chicago Press, 1930), 1:201-216. See especially the neurosurgical comment of Dr. Arno Luckhardt on p. 216.

31. Morgagni was often present, either as student or assistant, at Valsalva's autopsies.

Analysis of Morgagni's Letters II, III, IV, and V

	Total number of cases	History absent or inadequate	Remainder	Somnolence or coma	Paral. (hemiplegia, or cranial)	Convulsions	Blood in brain, ventric, or meninges	Encephalomalacia or "ulcers"	Serum in meninges	Serum in Ventricles	Gelatinous matter, meninges
Sanguineous	18	4	14	4	12	4	13	6	0	0	0
Serous[1]	15	5	10	3	7	2	0	0	7	7	2
Neither[2]	7	2	5	0	3	1	0	2	3	2	1
TOTAL	40	11	29	7	22	7					

1. Includes one case of fever, chills, purpura; "gelatinous matter" in meninges; possibly meningitis (IV. 9). Excluded is a case of fever, splenomegaly, and ileal ulcer, probably typhoid fever (IV. 26).

2. Under "neither sanguineous nor serous." Two cases of sudden death are excluded; one of these (V. 19) was probably syringomyelia. Of the five remaining cases, one was probably brain abscesss with meningitis (V. 2); one was sepsis and Morgagni was uncertain as to presence of true apoplexy (V. 4); one was encephalomalacia or brain abscess (V. 6); one was probably meningitis (V. 11). This leaves a case of right hemiplegia (V. 15), in which nothing was found but pigmentation.

No case in this group showed notable amounts of serum or gelatinous matter in the meninges or ventricles.

Among the ten patients who were listed under serous apoplexy, seven had paralyses and three had somnolence or coma. None had haemorrhage in the brain or meninges and none showed encephalomalacia, but seven had "serum" in the meninges and ventricles, and two had some kind of gelatinous material in the meninges. Of the five acceptable cases in the indeterminate category, three showed paralyses and none showed gross blood in the brain, ventricles, or meninges; two showed encephalomalacia or cerebral ulceration; three showed serum in the meninges, and in one the meninges contained gelatinous matter.

These statistics tell us that, in compiling his series, Morgagni had made a clean separation between cases in which blood was found in the brain or meninges and cases in which the meninges or ventricles contained "serum." The statistics show also that the small indeterminate category consisted mainly of old hemiplegics and paralytics in whom gross haemorrhage was no longer visible. When the cases of sanguineous apoplexy are compared with those of serous apoplexy, statistical analysis cannot be decisive, since the series are small, but the figures reveal no very impressive differences in the clinical signs. In the sanguineous category the percentage of paralytics was somewhat higher than in the serous category (85% versus 70%), as were the instances of convulsion (28% versus 20%); the incidence of coma was almost identical.

The analysis of Morgagni's material raises some questions, permits some inferences and some incidental observations, and leads to a relatively simple conclusion.

First, we may ask, what did Morgagni include under the term 'apoplexy'? On repeated rereading it becomes evident that he did not offer a clear definition. Instead, he opened his Letter II with an intricate discussion of Celsus and Caelius Aurelianus.[32] The reader is allowed to understand that apoplexy is often associated with sudden death,[33] that the proximate cause is "a sudden diminution of the internal motions perform'd in the brain,"[34] and that "there are many and

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32. *De Sedibus* II. 1-2.

33. *De Sed.* II. 4.

34. *De Sed.* II. 5.

various causes that bring it on, some of which entirely escape the notice of the senses."[35] After these preliminaries he mentions the "celebrated division of the apoplexy into sanguineous and serous" and he recalls that some physicians had objected to it.[36]

At this point it is necessary to point out again a curious defect in Morgagni's logic. Although his book was conceived as an attempt to explain symptoms and was arranged according to symptoms, he included some patients who had had *no* symptoms, i.e., who had been found dead or who had dropped dead before clinical data could be obtained. This made it necessary, during the foregoing statistical analysis, to exclude eleven cases from Morgagni's series of forty.

Another curious fact is his interpretation of cadavers in which the upper limbs were found to be flexed at the elbows, especially where the clinical history was absent or scanty. This finding was interpreted as evidence of convulsion.[37]

To the list of Morgagni's inclusions we must add a few cases in which the diagnosis of apoplexy would be rejected by modern physicians, for example cases of probable typhoid fever,[38] meningitis,[39] and syringomyelia,[40] (see also footnotes to table). Likewise of interest is Morgagni's inclusion of what might be called a control observation.[41] This was the case of a man who had virtually no definite clinical history. After vomiting he seems to have had hesitance of speech and brief stupor. Autopsy showed merely an abundance of fluid in the skull, especially under the pia. Morgagni points out that "there was, you see, no apoplexy in this man, and yet much water in the cranium."

Defying all rules of relevance and all constraints of literary coherence, I should like to call attention to an admirable passage which occurs in one of the letters on sanguineous apoplexy, since it contains a remote advance hint of what later became known as the "subclavian steal." The passage is as follows:

> ...nature has order'd that the vertebrals take their rise from the subclavian... But the left vertebral, in our apoplectic man, did not arise from the subclavian, but from the curve of the great artery [aorta] itself... I am not ignorant, however, that the same vertebral artery has been found to arise from the arch of the aorta in some bodies, not only by others, but by myself also, at other times; *but whether the persons, when living, had been subject to disorders of the head,* or not, I neither could know myself, nor do I remember it was observ'd by them [italics added].[42]

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35. *De Sed.* II. 5.
36. *De Sed.* II. 6.
37. *De Sed.* II. 22, IV, 21.
38. *De Sed.* IV. 26.
39. *De Sed.* IV. 29, V. 2, and V. 11.
40. *De Sed.* V. 19.
41. *De Sed.* IV. 35.
42. *De Sed.* III. 24.

Here Morgagni ingeniously suspected that anatomical variation in the origin of the vertebral artery might be responsible for cerebral signs.[43]

Having discussed the difficulties posed by Morgagni's definition, or non-definition, of apoplexy and the further difficulty caused by occasional errors in diagnosis, we must now consider an additional group of fundamental problems connected with the nature of the fluids that were found within the head. Blood was easy to recognize and black bile seems not to have been found. But what were the fluids variously characterized as pituitous matter (i.e., phlegm), or serum, or water? — to say nothing of the occasional gelatinous matter along the pial vessels?

The classical description of the cerebrospinal fluid was published by Domenico Cotugno in 1764,[44] three years after the *De Sedibus* and half a century after many of the autopsies that we have been considering.[45] During the decades of Morgagni's activity in the dissecting room there seems to have been no dependable systematic method for distinguishing among various kinds of colorless fluid, and the dominance of ancient humoralism had not ended. Hence cerebrospinal fluid was confounded with serum, with phlegm, and perhaps with thin pus. A pale fluid that was not blood was likely to be designated as serum, and Morgagni found no difficulty in using the term serum where Avicenna, Boerhaave, and others had used the term phlegm. And, after completing the carful systematic studies that I have here analyzed, Morgagni retained the category of serous apoplexy. He thus summarized the best information that he could obtain in the laboratory, the hospital, and the library.

After the monumental presentation in the *De Sedibus,* the concept of serous apoplexy began a slow decline. This is evident in the widely used textbook written by William Cullen:

> MCI. Such an interruption of the motions of the nervous power [as occurs in apoplexy] may be occasioned, either by some compression of the origin of the nerves, or by something destroying the mobility of the nervous power...
> MCIII. This compression...may be produced in different ways, as...
> 3. By the blood accumulated in the blood-vessels of the brain, and distending them to such a degree as to compress the medullary portion of the brain.

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43. For the earliest description of subclavian steal see M. Reivich, H. E. Holling, B. Roberts and J. F. Toole: "Reversal of Blood Flow Through the Vertebral Artery and its Effect on Cerebral Circulation," *N. Engl. J. Med.* 265 (1961): 878-885. These authors mention a curious anticipation in Willis' *Cerebri Anatome* (London, 1664).

44. D. Cotunnius, *De Ischiade Nervosa Commentarius* (Naples: apud Simonios, 1764). See also H. R. Viets, "Domenico Cotugno," *Bull. Inst. Hist. Med.* 3 (1935): 701-738. I here disregard the earlier work, meritorius but obscure, of M. L. Glandorp (1619).

45. For Cotugno's interesting account of his visit to the aged Morgagni, see F. Lombardi, *Le Scoperte Anatomiche de Domenico Cotugno e il suo "Iter Italicum Patavinum"* (Naples: Licenziato, 1964).

> 4. By fluids effused in different parts of the brain, or into the cavity of the cranium...the fluids effused may be...either a portion of the common mass of blood...or a portion of serum or colourless fluid, poured out chiefly by exhalants...
> MCX...the increased afflux of blood into the arteries of the brain...may...occasion a rupture of their extremities...or...an increased exhalation from their extremities of a serous fluid...
> MCXIV...there is a foundation for the common distinction of this disease into the two kinds of Sanguine and Serous. But *this distinction cannot be very usefully applied in practice*... [italics added].[46]

This is the comment of an excellent teacher, experienced in clinical medicine.

During the early nineteenth century apoplexy was a popular subject for theses. The titles suggest that the old distinction between bloody and serous apoplexy had not been abandoned. Essays specifically limited to sanguineous apoplexy were published at Edinburgh in 1805[47] and 1823,[48] and between 1823 and 1838 at least six students at Paris issued theses, with almost identical titles, on "L'apoplexie ou hémorrhagie cérébrale."[49] In his *Clinical Lectures,* J. Hughes Bennett pointed out that the term apoplexy had been used in two senses:

> By the older writers and clinical observers, it was used to denote a sudden loss of consciousness and volition, independent of the various morbid lesions which may occasion these symptoms. By the followers of the French school of pathology, the same word had been applied to an extravasation of blood into an organ.... I believe it better to adhere to the meaning of our ancestors, the more so as it is not always possible to determine when a cerebral hemorrhage is present.[50]

As late as 1865 Armand Trousseau in his masterly lectures declared that apoplectiform symptoms might occur apart from cerebral hemorrhage and might be caused by rapid accumulation of "sérosité" in the meninges and ventricles, this condition being designated as "apoplexie séreuse."[51] But the equally eminent Sir Thomas Watson marked at once the demise and the denouement in a single Victorian sentence:

> I will not say, for I do not think, that there is no such thing as serous apoplexy — which is the opinion of many writers; but I do believe that almost all the cases which were

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46. W. Cullen, *First Lines of the Practicer of Physic* 4th ed. (Dublin: White, 1784), 3:74-83.
47. J. Barclay, *De Apoplexia Sanguinea* (Edinburgh: 1805).
48. M. Baillie, *De Apoplexia Sanguinea* (Edinburgh: 1823).
49. F. Cormao, 1823; P. Lefeuvre, 1826; P. Regnacq, 1830; C. Adam, 1831; A. Delthil, 1833; and D. Caillaux, 1838.
50. J. H. Bennett, *Clinical Lectures on the Principles and Practice of Medicine* (Edinburgh: Adam and Charles Black, 1859), p. 381.
51. A. Trousseau, *Clinique Médicale de l'Hôtel Dieu de Paris* (Paris: Baillière, 1865) 2:4.

formerly classed under that head, were really cases of uraemic coma.[52]

A concluding and conclusive piece of evidence is found in the *Index-Catalogue of the Library of the Surgeon-General's Office*. Under APOPLEXY, serous, Series 1 of the vast catalogue, published in 1880, presents twenty-eight references. Series 2 (1896) contains no references but merely advises the reader to see Apoplexy (Nervous, etc.). Series 3 and 4 likewise have no references. This can be considered either the epitaph or the tombstone of serous apoplexy.

Part of the total development is easily summarized. In antiquity a group of clinical phenomena was segregated as an entity and was provided with a humoral explanation. Not until the seventeenth century did an anatomical substrate become available, but even then the humoral explanation was retained, and matters continued thus in the eighteenth century as anatomical observations accumulated. This much can be documented by the historian. The concept passed into desuetude in the nineteenth century, probably because of advances in physiology and especially in chemistry, concurrent with improved knowledge of clinical medicine.

As far as I have been able to ascertain, the later history of serous apoplexy has not been subjected to careful analysis. I shall merely hazard the suggestion that its disappearance may be due to displacement by the concept of *uremia,* introduced by Piorry in 1840.[53] As late as 1933 the *Oxford English Dictionary,*[54] in naïve disregard of medical literature and medical speech, asserted incredibly that the word had not been naturalized in the English language, although the noun was recorded in Dunglison's *Medical Lexicon* in 1857 and the adjective in 1855. This does not end the story, since in the early twentieth century the belief that uremia explains convulsive and other cerebral symptoms gave way before the investigations of Volhard[55] and others. The present state of knowledge is represented by the concept of hypertensive encephalopathy,[56] which offers the best currently available correlation of clinical, anatomical, and chemical observations.

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52. T. Watson, *Lectures on the Principles and Practice of Physic* 5th ed. (London: Longmans, Green, 1871), 1:456-457.

53. P. A. Piorry and D. Lhéritier, *Traité des Altérations du Sang* (Paris: Bury and Baillière, 1840). In chapter XII (Toxicohémie), pp. 11, 14, and 16 the concept of toxic absorption from diseased kidneys is discussed but the word *urémie* is not found.

54. *Oxford English Dictionary* (1933); compact edition (London: Oxford University Press, 1975), p. 3569, s.v. "uremia."

55. F. Volhard and E Becher, "Urämie," in *Neue Deutsche Klinik,* G. Klemperer and F. Klemperer eds. (Berlin: Urban und Schwarzenberg, 1932) 10:649-83. For the scanty and indecisive findings in the brain in uremia see G. Bodechtel, and F. Erbslöh, "Die Veränderungen des Zentralnervensystems bei Nierenkrankheiten," in F. Henke, O. Lubarsch, and R. Rössle, *Handbuch der speziellen Pathologischen Anatomie und Histologie* (Berlin: Springer, 1958) vol. 13, part 2B, pp. 1392-1427.

56. B. S. Oppenheimer and A. M. Fishberg, "Hypertensive Encephalopathy," *Arch. Int. Med.* 41 (1928): 264-278.

II
Incubus

Two decades ago it might have been possible to contend that incubus (nightmare) is a forgotten disease. Indeed, it was scarcely regarded as a disease at all. Occasionally it was the object of ridicule, like obesity and the itch. Yet in much earlier times it had been respected and feared and was regularly discussed in textbooks. Its long history helps us understand how incubus has now come to be regarded as a disease worthy of renewed investigation.

Remote Greco-Roman antiquity bequeathed to later centuries the myth of giants, among them Ephialtes, who attacked the gods and, appearing at night, left human beings gasping in terror. The appalling spectres, it was thought, might on occasion make sexual attacks on women. Such things are mentioned by Augustine[57] and ridiculed by Strabo.[58] These confused notions mingled indistinctly with the observed fact that some human beings from time to time suffered terrifying nocturnal attacks during which they would come awake and might discover that they had had dreams of pursuit by an enemy. Attempting in vain to inhale through a constricted throat, such persons could at most emit a groan or a howl, and they would feel that respiration had become suspended. Sometimes these troubles were accompanied by a sensation of pressure in the chest. To the Greeks this symptom complex was known as *ephialtes*, to the Latins as *incubus*. The English term is *nightmare*, and it is presented in the *Oxford English Dictionary* as follows:

> A female spirit or monster supposed to beset people and animals by night, settling upon them when they are asleep and producing a feeling of suffocation by its weight.... A feeling of suffocation or great distress felt during sleep, from which the sufferer vainly tries to free himself...[59]

Among ancient writers it is Caelius Aurelianus[60] who gives the best description. He points out the sense of pressure and suffocation during sleep, and the "inane visions." Aetius[61] says that no demon is present, but the disease is a prelude to epilepsy, insanity, or apoplexy. He adds that when the cerebral ventricules are filled with thick cold vapors, these prevent the neural powers from passing through the nerves. This convenient etiology served also for apoplexy (see Part I, above).

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57. Augustine, *Civitas Dei* XV.23. See also *Iliad* V. 385; *Odyssey* XI. 308; and Pindar, *Pythian Odes* IV. 89. The incorrect description in *Aeneid* XII. 908 suggests that Virgil slept well; if he had ever had a real nightmare, he would not have forgotten it.
58. Strabo, *Geography* I.2.8.
59. *Oxford English Dictionary* (concise edition), op. cit. supra, p. 1926, s. v. "nightmare."
60. Caelius Aurelianus, *De Morbis Acutis et Chronicis*. Chronic Diseases, Book I, chap. III.
61. Aetius, *Tetrabiblos*, Book II. Sermo II, Chap. XII.

Both in antiquity and in later periods there was a tendency to confuse nightmare with nocturnal epilepsy.[62] Both ailments also gave rise to controversy as to their possible natural or supernatural origins.[63]

To represent the Middle Ages I have chosen Avicenna. His brief description of incubus[64] presents most of the clinical details, *viz* noctural occurrence, terrifying fantasies, sensations of pressure, interference with voice, and fear of suffocation. The terminology is especially interesting: Avicenna designated nightmare by the Arabic words *al-kābūs*, the squeezer, *al-khānaq*, the strangler, and *al-gāthūm*, that which alights or perches. He held to the inherited belief that nightmare leads to apoplexy, epilepsy, or mania.

To mark the advent of modernity in the study of incubi we may use the treatise by Johannes Wierus, *De Praestigiis Daemonum* (On the Tricks of Demons), published in 1564.[65] This work, rationalistic in tone, devotes a chapter to nightmare, which Wierus described as a natural and not a supernatural disease, believed by some physicians to be a minor form of epilepsy.

During early modern times incubus was a standard feature of medical treatises, so that the medical historian has no difficulty in finding source material in textbooks; in addition, he has the help of occasional theses. A fair sample of the former is the work of Daniel Sennert,[66] who says that he has limited himself to physical causes, avoiding the question of possible demonic origins. His text considers thick vapors and obstruction of the cerebral ventricles.

A presentation typical of the seventeenth-century is found in the writings of John Johnston, who gives what may be considered an orthodox naturalistic definition:

> Incubus is an interruption, especially of respiration and voice, with a false dream of a heavy object lying upon the chest and causing suffocation on account of an impediment to free penetration of spirits to the nerves, the pathways being obstructed.[67]

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62. O. Temkin, *The Falling Sickness* 2nd ed. (Baltimore: Johns Hopkins Press, 1971), p. 44 and n. 276.

63. For example Temkin, p. 108, speaks of "the reserved attitude of medieval physicians toward the supernatural origin of disease."

64. Avicenna, *Canon*, book III, fen I. treatise V, chap. 5.

65. J. [Johann Weyer] Wierus, *De Praestigiis Daemonum* (Basel: Oporinus, 1564) See book II, chap. 33, pp. 238-241, "De incubi daemoniaci illusione, et incubo morbo naturali."

66. D. Sennert, *Institutionum Medicinae Libri V*. Book II, part III, section II, chap. VI. In his *Opera Omnia* (Paris, 1641).

67. I. Ionstonus, *Idea Universae Medicinae Practicae* (Amsterdam: Elzevirius, 1648), pp. 412-414, "De Incubo et Catalepsi." A similar statement occurs in F. Sylvius, *Opera Medica*, (Amsterdam: Elsevirius and Wolfgang, 1679) 459. (*Praxeos Medicae*, book II, chap. 25).

An unobtrusive hint of what was to come later appears in the manual written by Melchior Sebizius, Jr.[68] He says that the symptoms of *pulmonary disease* are asthma, orthopnea, hemoptysis, cough, impaired voice, and incubus; these conditions he discusses seriatim.

Special interest attaches to the comments of the eminent clinician Franciscus Deleboe Sylvius (1614-1672), who suffered from the disease[69] and described it concisely in a separate chapter.[70] Sylvius mentions incubus also in his discussion of dyspnea.[71]

We may note among seventeenth-century contributions the opinion of Thomas Willis,[72] who considered nightmare a disease of the cerebellum.

Many ancient and early modern discussions of incubus mention its possible relation to epilepsy, apoplexy, and mania, all of these being conditions that reflect disturbances of the brain. At this juncture, on selecting some typical eighteenth-century contributions, we must notice a problem or trait that is adumbrated in the seventeenth century and developed in the eighteenth. This is the differential diagnosis between nightmare and *respiratory* disease.

In 1721, Johann Christoph Hufelandt, grandfather of the more famous Christoph Wilhelm Hufeland,[73] presented a thesis titled *Medical Inaugural Dissertation on the Distinguishing Traits of Convulsive Asthma and Suffocative Catarrh.* In speaking of the former sickness he says:

> A certain resemblance...occurs also in what is called incubus, in which there is likewise a sudden oppression in the chest, with very difficult anxious and virtually suffocative breathing.[74]

Hufelandt noted, however, that incubus is transitory and needs no treatment. Further, whereas incubus occurs only during sleep, asthma is not limited to sleep and does not disappear when the patient comes awake.[75]

In 1718 and again in 1724 and 1734, an obscure professor and compiler named Junckerus issued a compendium titled *A Summary of Theoretical and Practical*

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68. Melchior Sebizius jun., *Manuale, sive Speculum Medicinae Practicum,* (Argentorati: 1661), pp. 817-818.

69. F. D. Sylvius, *Opera Medica* (Amsterdam: Elsevirius, 1679) p. 835 ("et inter ipsos quoque").

70. Sylvius, p. 474.

71. Sylvius, p. 835.

72. T. Willis, *De Anima Brutorum* (London: Davis, 1672), pp. 244-248.

73. His biographers regularly use the modernized spelling of the name.

74. J. C. Hufelandt, *Dissertatio Inauguralis Medica de Differentiis Asthmatis Convulsivi, et Catarrhi Suffocativi.* (Halle: Henckelius, 1721). See sect. 19.

75. A recent psychophysiological review mentions disturbances of sleep in asthma and other respiratory diseases. R. L. Williams and I. Karacan, *Sleep Disorders* (New York: Wiley, 1976), pp. 286-288.

Medicine....[76] This work, concise but more mature than Hufelandt's thesis, adds several details: nightmare occurs only in those who are asleep or at least half asleep but convulsive asthma is virtually limited to the waking hours; nightmare suppresses clear voice to a degree not observed in convulsive asthma; also nightmare is the less dangerous of the two diseases.

At this juncture a new dimension must be considered. Recent research[77] has shown that the designation *suffocative catarrh,* considered in the systems of differential diagnosis that we have been examining, covered mainly what we now call acute pulmonary edema. Moreover, a unified conception of heart failure was yet to appear, and various clinical entities such as several forms of asthma and pleurisy rested on uncertain evidence. These facts make it possible to understand why sixteenth- and seventeenth-century physicians could not ignore nightmare in their vexatious problems of thoracic differential diagnosis.

The problem as it then existed is revealed in two of the letters in Morgagni's *De Sedibus.* In Letter VI, paragraph 1 he writes:

> For the incubus, or night-mare, and the horrid dreams which usually attend it, not only happen very rarely, but are never mortal till they have degenerated into other disorders.

In Letter XVIII, paragraph 6 he says that "a certain young man, being often troubl'd with a disorder similar to the nightmare, and in like manner with a difficult respiration, to which a slight fever had been join'd, seemed to recover, almost entirely, by the loss of some blood...." The symptoms soon returned and the nightmare patient died. He was found to have hydrothorax, a greatly enlarged heart, and aortic stenosis.

During the early nineteenth century incubus continued to receive routine mention in treatises on general medicine. A typical example is the commonsensical book by James Thacher, *American Modern Practice,* which was published in Boston in 1826. Thacher, expressing an opinion that is widely current nowadays among both the learned and the unlearned, says: "This is a nervous affection, and arises chiefly from indigestion and oppression of the stomach, in consequence of eating a heavy supper just before going to bed[78].... Deep thought, anxiety, and a sedentary life may produce the night-mare." Thacher recommends a nocturnal glass of brandy "or peppermint water, which is better."

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76. J. Junckerus, *Conspectus Medicinae Theoretico-Practicae, Tabulis CXXXVIII Omnes Primarios Morbos Methodo Stahliana Tractandos*... 3rd ed. (Halle: 1734).

77. S. Jarcho, *The Concept of Heart Failure from Avicenna to Albertini* (Cambridge: Harvard University Press, In press); see esp. chapter XX and the appendix.

78. The sentence omitted from this quotation says that "wind in the stomach is also a very frequent cause of this complaint," a sentiment that would have been received favorably by the author of the Hippocratic *de Flatibus.*

The early nineteenth-century literature includes an overlooked treatise published in 1816 by John Waller, a medical officer in the British navy, and titled *A Treatise on the Incubus or Night-Mare, Disturbed Sleep, Terrific Dreams, and Nocturnal Visions.* Waller, a victim of recurrent nightmare, points out correctly that "very little assistance could be obtained in this undertaking, from the writings of modern physicians, who have paid little or no attention to it: those of the sixteenth and seventeenth centuries, seem to have well understood both its causes and cure, but differed much among themselves respecting its nature...."[79] Waller's book is memorable for the statement that while he was on duty in the West Indies he could produce an attack of incubus at any time, *day or night*, by eating avocados.[80] This simple observation deserves to become more widely known and I shall refer to it again in a later paragraph.

As the twentieth century draws to a close, we can see that the weird history of incubus had begun to be forgotten and the symptom complex had flowed away from the mainstream of medical consciousness. Unmentioned in leading textbooks of internal medicine and ignored also by textbooks of neurology, it slipped into the domain of psychiatry.

In 1931, Dr. Ernest Jones, an ayatollah of the Freudian creed, published an interesting book on the subject of nightmare. While pointing out the inadequacy of medical and biochemical explanations, he expressed himself as follows:

> The three cardinal features of a typical Nightmare are: (1) agonizing dread; (2) a suffocating sense of oppression at the chest, and (3) a conviction of helpless paralysis... The explanations of this condition still current in medical circles, and which ascribe it to digestive or circulatory disturbances, are probably farther from the truth than any other medical views, and show as little knowledge of the pathogenesis of the condition as was shown in regard to the infection of wounds before Lister's day, or to tuberculosis before Koch's.[81]

Jones elsewhere added[82] that "there is a kernel of truth" in all the medical hypotheses that have been advanced, but these are merely "the exciting causes." He concluded, with no data that can be regarded as evidence, that nightmares are due to mental conflict over an incestuous desire.

The dismissal of nightmare from the literature of general clinical medicine could involve more than mere lack of interest in the syndrome. It might entrain the consequence that research would cease to be undertaken, that new facts would

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79. Waller, p. 5.

80. Waller, p. 105.

81. C. Fisher, "Dreams," in *The Encyclopedia of Mental Health*, ed. A. Deutsch (New York: Watts, 1963), 2:505-509.

82. E. Jones, *On the Nightmare* (London: Hogarth Press, 1931), pp. 74-75. I thank Dr. George E. Daniels for calling my attention to this book.

cease to be gathered, and that new concepts would cease to be formed. These possibilities have been averted by advances in neurophysiology and physiological neuropsychiatry, based ultimately on Johannes Berger's discovery of the electroencephalogram in 1929, and conducted during the last sixteen years by Gastaut, Broughton, Fisher, and others.[83] One incidental consequence of these important investigations has been the clearer separation of nightmare from night terror; the latter appears in the older literature as *pavor nocturnus.*

In an earlier paragraph I called attention to the report of a nineteenth-century physician[84] who repeatedly suffered attacks of nightmare after eating avocados. If this observation means anything, it points to a chemical cause, possibly idiosyncratic, but susceptible to study in a group of sufferers. It is important to note in this connection that recent neurophysiological research on nightmare has included studies in pharmacology.[85]

One additional aspect should be mentioned. From time to time physicians are confronted by the enigma of the patient who has died during sleep and in whom autopsy furnishes no satisfactory explanation. At first consideration this problem seems utterly intractable, but one suggestion can be offered. It would be possible to institute a long-term study, analogous to the cardiological investigation that was conducted in Framingham, Massachusetts. If a population of sufferers from nightmare were kept under intermittent observation for a series of decades, it would become apparent whether nightmare is associated with an increased risk of sudden death. It is at least conceivable that some sufferers from nightmare are driven into fatal cardiac arrhythmia. This simple investigation might make it possible to add a new and interesting chapter to an old and interesting story.

III
Retrocedent Diseases

The present discussion of obsolete nosologic concepts began with *serous apoplexy,* a nosologic entity which vanished with the advent of uremia and hypertensive encephalopathy. The second theme was *incubus.* This condition, now ignored by internists and scanted by neurologists, is presently claimed by psychiatrists but may yet become the property of neurochemists or psychopharmacologists. We now come to a concept which has almost wholly

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83. Extensive references can be found in C. Fisher, E. Kahn, A. Edwards, and D. M. Davis, "A Psychophysiological Study of Nightmares and Night Terrors," *Arch. Gen. Psychiatry* 28 (1973): 252-259. See also J. Berger, "Ueber das Elektrenkephalogramm des Menschen," *Arch. Psychiatr. Nervenkr.* 87 (1929): 527-570.

84. Waller, p. 105; see note 80, above.

85. References in C. Fisher. (see note 83 above).

dropped out of clinical medicine, the concept of *retrocedent diseases*. This category contains sicknesses or manifestations that have been *driven inward* from the exterior of the body. We no longer use either the term or the concept, having supplanted them in part, with subtle changes in scope, by the notion of metastasis.

There is evidence that the ancient Greeks were interested in the relation between the interior and the exterior of the human body. For example, in the Hippocratic treatise *On Humors* we read:

> Of remedies that may help or harm, those applied externally include anointing, affusions... and the like; the internal parts of the body react to these remedies just as the external parts react to remedies applied internally.[86]

Further, the famous *Epidemics* tells of a two-year-old child who had a cutaneous eruption followed by convulsions and death.[87] The same treatise mentions gangrene, apparently in a phlebotomized arm, with subsequent transfer of the disease to the lung. The writer adds:

> Soon there were signs there [in the lung] while she still lived, and so it is with other things that are carried inward.[88]

Another passage[89] presents a baffling case of alleged transfer of disease from the spleen to the thigh and back to the spleen.

Discussed most often and in greatest detail is spread from infections of the throat and lung. For example, the Hippocratic *Prognostic*[90] points out that in pharyngeal angina a patient may recover when there is redness over the neck and chest, if the redness does not go inward. The same statement appears also in the *Coan Prenotions*.[91] Analogous considerations apply to pulmonary infection. The *Prognostic*[92] says that in cases of pneumonia the disappearance and retrocession of [external] abscesses[93] without maturation of the sputum or cessation of fever presents great danger. This observation appears also in the *Coan Prenotions*.[94]

These experiences and attitudes are reflected in a remark of Galen,[95] who did

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86. *Humors*, sect. 10: Littré V. 491. I have used the translation by W. H. S. Jones in Hippocrates, *Works* (London: Heinemann, [Loeb Classical Library] 1931), 4:81-83.
87. *Epidemics* VII. 106; Littré V. 181.
88. *Epidemics* IV. 39; Littré V. 181.
89. *Epidemics* VII. 114; Littré V. 463.
90. *Prognostic* 23 23; Littré II. 177.
91. *Coan Prenotions* II. 19. 359; Littré V. 661.
92. *Prognostic* 18; Littré II. 161-163.
93. The Greek text uses the word *apostasies*, which Littrê translates as *depôts*.
94. *Coan Prenotions* II. 20. 390; Littrê V. 671.
95. Galen, *De Naturalibus Facultatibus* III. 13; Kühn II. 193-194.

not find it surprising that something should pass from the skin to the stomach. Another gifted physician, Aretaeus the Cappadocian, makes the interesting observation[96] that in certain cases of cynanche (severe infection of the pharynx) there is easy transfer of the disease to the chest, and such patients are apt to die.

The Hippocratic passages that have been cited above regularly use the verb *palindromein*. The obvious literal meaning of this word is *to run back again*; in medical writings it most often signifies to recur, to strike inward, and — of an abscess — to go back or subside without coming to a head.[97] The same verb is used by Lucian[98] to signify the return (recurrence) of a mental disease. The useful seventeenth-century dictionary of Blancardus[99] says that "PALINDROME, est morbus recidivus." Thus there are two principal meanings: *to pass inward* and *to recur*. It is in the latter sense that Hench and Rosenberg[100] used the word when they introduced the term *palindromic rheumatism*, which is a kind of rheumatism that recurs frequently. Unlike many of the palindromic cases of Hippocrates, in which disease spread inward, the cases described by Hench and Rosenberg showed little evidence of internal disturbance.

Retrocedent Gout

In the list of diseases which recur, gout has long had a prominent place. The disease is mentioned, with varying degrees of clarity and obscurity, by various ancient authors, such as Hippocrates and Celsus. In one excessively brief passage Galen says that gout may pass to the stomach:

> In some persons rheumatism or sciatic pain, or gout, and in other persons headache or some discharge that has alighted in the eyes or ears, has now migrated into the stomach.[101]

Elsewhere he mentions the danger of interrupting the flow of gouty matter to the joints:

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96. Aretaeus, "On the Causes and Symptoms of Acute Diseases," 1.7, in *The Extant Works of Aretaeus, the Cappadocian*, ed. and trans. Francis Adams (London: Sydenham Society, 1856), p. 251.

97. Based on H. G. Liddell and R. Scott, *A Greek-English Lexicon*, ed. by H. S. Jones. With supplement, 1968. 9th ed. (Oxford: Clarendon Press, 1977), p. 1292.

98. Lucian, *Apokeruttomenos* [*Abdicatus*] 32, trans. by A.M. Harmon (N.Y.: Heinemann [Loeb Classical Library], 1913-36), 5:522.

99. S. Blancardus, *Lexicon Medicum* (Jena: Müller, 1683), facsimile (Hildesheim: Olms, 1973), p. 356.

100. P. S. Hench and E. G. Rosenberg, "Palindromic Rheumatism," *Arch. Int. Med.* 73 (1944): 293-321.

101. Galen, *De Methodo Medendi* VII. 11 (Kühn X. 513).

> Indeed, other drugs which gouty persons take to drive away the disease, prevent the flow from being carried to the feet, but those that do not dispel its superfluity create a bigger disease.[102]

He then goes on to say that the lung, being delicate and being constantly in motion, is likely to attract the gouty material. This causes suffocation. In modern terminology this may mean that gout is sometimes followed by respiratory or cardiac symptoms.

The great classic description of the disease is the *Treatise of the Gout and Dropsy,* published by a sufferer, Thomas Sydenham, in 1683.[103] This work is credited with clarifying the differences between gout and other articular maladies. Sydenham points out that sometimes "the morbific matter, which should have been deposited in the joints, is translated to the viscera."[104] He says also that he had seen, less often, "a translation of the peccant matter to the lungs."[105]

A quarter-century after Sydenham the great Boerhaave wrote in his *Aphorisms* (1709) that nothing was more dangerous than to interrupt the flow of mature gouty matter to its proper places [i.e., the joints], where it caused pain but was not harmful. But if the matter is detained, the consequence may be apoplexy, somnolence, tremor, and general convulsions if it enters the brain, and asthma, cough, and suffocation if it enters the lungs.[106] He adds that if there are signs of gouty material having turned inward — *materiae podagricae introversae* — an immediate effort should be made to chase it into the joints.[107]

The next landmark was provided by William Cullen, whose popular textbook, *First Lines of the Practice of Physic*, first published in 1776, was repeatedly reissued. Cullen introduced the term *retrocedent gout* to describe the condition in which "some internal part becomes affected."[108] He says that the internal part most commonly involved is the stomach, but sometimes it is the heart and sometimes it is the head. The term retrocedent gout gained quick acceptance and wide use. In later paragraphs I shall trace its career.

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102. Galen, *De Theriaca ad Pisonem* XV; Kühn XIV. 274-275.

103. T. Sydenham, *A Treatise of the Gout and Dropsy* [1683], in his *The Entire Works,* trans. and ed. by John Swan, 2nd ed. (London: Cave, 1749) pp. 416-463.

104. Sydenham, paragr. 62, p. 457.

105. Sydenham, paragr. 65, p. 458.

106. H. Boerhaave, *Aphorismi* [1709], in his *Opera Omnia Medica* (Venice: Basilius, 1757), p. 265, aphorism 1273.

107. Boerhaave, p. 267, aphorism 1281. The reader will note that aphorism 1281 in the edition of 1757 is misnumbered 1181.

108. W. Cullen, *First Lines of the Practice of Physic,* 4th ed. (Edinburgh: Elliot and Cadell, 1784), 2:72, paragr. 712.

During the hundred years that elapsed between 1776 and 1876, the gouty material was identified as uric acid and its vicissitudes were characterized. This was accomplished by Scheele,[109] Wollaston,[110] and A. B. Garrod.[111] The peccant humor long surmised to exist in gout gained new credit under its new designation as uric acid.

Meanwhile the concept of retrocedent gout began imperceptibly to fade. This can be seen or suspected in Aitken's widely read textbook, *The Science and Practice of Medicine*.[112] Aitken says:

> In the course of this disease there may be a metastasis to the stomach or other part, and the affection is then termed retrocedent gout, the pain in the joints being trifling, or having entirely subsided.... Besides metastasis to the stomach and intestines, this retrocedence may take place to other parts, as to the testicle, bladder, rectum, or to the head....[113]

This is a fair presentation of the standard opinion of the era, but on another page Aitken says:

> If acute gout should have 'retroceded' *as it is called* [italics added], and the stomach or intestinal canal be inflamed, leeches should be applied to the abdomen or epigastrium.[114]

At about the same time the reliable textbook of Sir Thomas Watson said the following:

> In another variety of irregular gout, the complaint commences, in the ordinary way, in a joint; but the pain and inflammation do not reach the ordinary degree of intensity... they disappear abruptly and entirely, while symptoms of severe and alarming disorder arise, as suddenly, in some internal part. This Cullen names *retrocedent* gout. It affords an example, as I conceive, of true metastasis.[115]

Watson goes on to say that the internal part most commonly attacked is the stomach. More rarely the retrocession is to the heart or to the head. Slightly later the authoritative *A Treatise on Gout* by Sir Dyce Duckworth discussed at great

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109. K. W. Scheele, "Undersökning om Blasestenen," *Kongl. Vetenskaps-Acad. Handl.* 37 (1776): 327-332. Translated in his *The Chemical Essays* (London: 1786), pp. 199-206.

110. W. H. Wollaston, "On Cystic Oxide," *Phil. Trans.* 100 (1810): 223-230.

111. A. B. Garrod, *The Nature and Treatment of Gout and Rheumatic Gout* (London: Walton and Maberly, 1859; third edition, 1876).

112. W. Aitken, *The Science and Practice of Medicine*, 4th ed. in 2 vols. (London: Griffin, 1866).

113. Aitken, 2:46-47.

114. Aitken, 2:53.

115. T. Watson, *Lectures on the Principles and Practice of Physic* 5th ed. (London: Longman and Green, 1871), 2:821.

length and in valuable detail retrocedence to the heart, brain, and other organs.[116] In the next generation James Lindsay[117] of Bath referred to retrocedent gout as "a well-recognized condition by which... the gout becomes abarticular."

The decline and fall of retrocedent gout can be traced by comparing two editions of William Osler's textbook.[118] In the seventh edition (1909) Osler says:

> The term retrocedent or suppressed gout is applied to serious internal symptoms, coincident with a rapid disappearance or improvement of the local signs. Very remarkable manifestations may occur under these circumstances....[118]

In the sixteenth edition, thirty-eight years and two world wars later, Henry A. Christian wrote the following, under "complications [of gout] and coincidental diseases":

> Here are to be grouped the many disturbances formerly regarded as irregular gout, retrocedent gout... etc. Some... are strictly speaking complications; most are merely coincidental.

In later textbooks retrocedent gout is rarely mentioned.

What caused the concept to disappear? According to all available evidence, medical and non-medical, literary, and even pictorial, gout was very common, especially in Great Britain, in the eighteenth and nineteenth centuries. It would therefore be difficult to sustain the thesis that our present view is due to enlarged experience. We are left with the explanation that improved methods of chemical analysis and their frequent application, both in cases of genuine gout and in cases where suspicion of gout proved misleading, enlarged our ability to expose coincidences. At the same time our ability to detect other diseases, such as heart failure and infections, has also gained greatly in accuracy and in profundity. We therefore have come to feel that if a man recovers from an attack of gout and then develops asthma or apoplexy, these distressing occurrences are not properly gout, and we decline to adopt a *post hoc ergo propter hoc* attitude. This, I think, may be what caused retrocedent gout to recede from our nosology. The phenomena continue to occur, but our grouping of them has changed.

Retrocedent Scabies

Great obscurity surrounds ancient Greek descriptions of diseases of the skin, such as *lepra* and *psora* (scabies?). While it is difficult to be certain of the modern equivalents of these terms, it is reasonably clear that the Greeks regarded most or all cutaneous diseases as external manifestations of internal humoral

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116. D. Duckworth, *A Treatise on Gout* (Philadelphia: Blakiston, 1889), 284-294.

117. J. Lindsay, *Gout; Its Aetiology, Pathology and Treatment* (London: Frowde, 1913), p. 117.

118. W. Osler, *The Principles and Practice of Medicine* 7th ed. (New York: Appleton, 1909), p. 403; 16th ed., by H. A. Christian, (New York: Appleton-Century, 1947), p. 578.

disturbances. We read in Hippocrates[119] that lepra, prurigo, scabies, impetigo, and vitiligo come from phlegm. Similarly, Galen[120] says that *psora* and *lepra* are skin diseases that come from black bile, and that those whose fluids are melancholic suffer from cancer, *lepra,* and *psora.*[121] In one of his comments on the *Aphorisms* of Hippocrates,[122] Galen says that in springtime the body is purged of harmful humors, which pass from the main parts of the body to the skin, causing *lepra*, vitiligo, impetigo, and ulcerating pustules.

It is not difficult to show that these concepts and beliefs persisted for many centuries. In his chapter on scabies and pruritus Avicenna wrote:

> The matter from which scabies is produced is either bloody matter, with which choler is mixed and perhaps is turned wholly or partly, into black bile; or it is bloody matter mixed with salt phlegm resembling borax.[123]

Half a millennium later Jean Fernel[124] wrote that almost every external disease draws its origin from an internal cause.

Accompanying the belief in humors was the belief in retrocession of external conditions to the interior. With respect to gout this concept was discussed in previous paragraphs. But retrocession was by no means limited to gouty deposits. It was generally believed that cessation of chronic or habitual blood-loss might have serious consequences. For example, Aretaeus stated that cachexia[125] and vertigo[126] could be caused by suppression of the hemorrhoidal flux.

Menstrual loss was discussed in many treatises. It was held that suppression of menstrual bleeding had an unfavorable effect, especially on the lung. Thus, Hippocrates[127] wrote that suppressed menstrual discharges went to the lung and caused suppuration there. In the opinion of Celsus the same process produced hemoptysis.[128] Hieronymus Capivaccius, a Renaissance author, wrote in his

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119. Hippocrates, *De Affectionibus,* 35. Littrê VI. 246-247.

120. Galen, Kühn XV. 369.

121. Galen, *De Probis Pravisque Alimentorum Succis,* XIV. Kühn VI. 814.

122. Galen on Aph. III. 20. Kühn XVII (B) 616-617.

123. Avicenna, *Canon,* book IV, fen 7, tract 3, chap. 6.

124. I. Fernelius (Jean Fernel), Praefatio (p. 219), Book 7, 'De Externis Corporis Affectibus, of "Pathologiae lib. VII" in *Medicina...* (Paris: Wechel, 1554).

125. Aretaeus, "On the Causes and Symptoms of Chronic Diseases," 1.16 (note 29) 329.

126. Aretaeus, *The Cure of Chronic Diseases,* 1. 3 trans. Adams, p. 464.

127. *Diseases of Women*; Littré VIII. 18-19.

128. Celsus IV. 11. 3.

Practica Medicina that suppression of hemorrhoids might cause asthma.[129] It was also believed that asthma — the term in those days included several varieties of dyspnea — might have other causes. For example Junckerus[130] stated in 1734 that asthma may be caused by edema driven inward *(oedemata retropulsa)*, and that it might be produced by retropulsion of scabies, impetigo, or the residuals of smallpox. A similar opinion was expressed by an author named Roemplerus,[131] who wrote that pectoral congestion may occur when peripheral excretions such as scabies, milk crusts, or ulcerated fluxes are driven inward.

The concept of retrocession or retropulsion necessarily affected the treatment of cutaneous diseases. A typical statement is found in the fascinating *Tractado Breve de Medicina,* published in Mexico in 1592 by the priest-physician Agustín Farfan. Farfan wrote that scabies occurs when the blood is excessive or corrupt; it also occurs when choler or phlegm or a melancholic humor is present in the blood. In the treatment of scabies no ointment should be applied until purgation and bleeding have been done, lest the ointment drive back into the body the humor which nature has ejected to the surface:

> Haviendo la naturaleza echado el humor fuera al pellejo, con la untura lo bueluen a meter dentro. Y assi haze el daño que dixe.[132]
> After nature has thrown the humor outside to the skin, with the ointment they turn and push it back in. Thus the harm that I have mentioned is done.

In addition, says Farfan, scabies caused by cessation of hemorrhoidal bleeding should be treated by reopening of the hemorrhoids.[133]

A further therapeutic suggestion is found in the writings of the ingenious Baglivi, who says that when the retropulsion of scabies has caused asthma, the patient should be put to bed with another victim of scabies in order to draw the

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129. H. Capivaccius, *Practica Medicina* (Frankfurt: Paltheniana, 1594), p. 377.

130. J. Junckerus, *Conspectus Medicinae Theoretico-Practicae* 3rd ed. (Halle: Orphanotrophaeum, 1734) 282.

131. J. C. Roemplerus, *De Catarrho Suffocativo* (Halle: Hendelius, 1720), section 4.

132. A Farfan, *Tractado Breve de Medicina* 2nd ed. (Mexico: Ocharte, 1592; facsimile, Madrid: Ediciones Cultura Hispanica, 1944), pp. 117 *verso* and 118 *recto*. See also S. Jarcho, "Medicine in Sixteenth Century New Spain as Illustrated by the Writings of Bravo, Farfan, and Vargas Machuca," *Bull. Hist. Med.* 31 (1957): 425-441.

133. Farfan, 118 *verso*.

humors outward again.[134] This idea is copied, with proper attribution but without comment, by the eminent clinician Stoll.[135]

It is obvious that the concept of retrocedent diseases, being based on humoralistic doctrine, could not survive the collapse of that doctrine. Hence retrocedent gout, retrocedent hemorrhoids and retrocedent scabies were stricken from the register of diseases, after a long and interesting history.

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134. G. Baglivi, "Appendix de asthmate" in his *De Praxi Medica*, book I, of *Opera Omnia* (Bassano: 1732), p. 97.

135. M. Stoll, "Ex scabie retropulsa si fiat asthma, cum scabioso dormiendum est, ut scabies revocetur...," in his *Rationes Medendi* (Vienna: Kraus, 1780-94), 6:53, sect. 180.

The Emergence of the Greek Medical Profession in the Roman Republic

JOANNE H. PHILLIPS

INTRODUCTION

IN the course of relating his views on the historical development of medicine and the medical profession the Elder Pliny (ca. A.D. 23-79) states that the Romans lived for an exceedingly long period of time without physicians *(medici)*, but not without medicine *(medicina) (HN* 29.11).[1] His statement yet remains remarkably accurate for the early period of Rome's growth and expansion in Italy; all evidence for the existence of physicians before the end of the late third century B.C. has not proved sound.[2] The Romans appear to have been quite content hitherto with a traditional Roman folk medicine, a *medicina domestica*, wherein disease remained essentially a force of divine dispensation, wherein prayers, expiations, magical practices, simple surgical manipulations, and household recipes (predominantly herbal) prevailed under the auspices of the *pater familias*.[3]

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1. *...ceu vero non milia gentium sine medicis degant nec tamen sine medicina, sicuti populus Romanus ultra sexcentesimum annum...* (A. Ernout, *Pline L'Ancien. Histoire Naturelle. Livre XXIX* [Paris, 1962]). Cf. Pliny, *HN* 29.28. On the numerical data, *sexcentesimus, sescenti,* see A. Oennerfors, *Pliniana,* Acta Universitatis Upsaliensis no. 6 (Uppsala, 1956), 128.

2. R. Briau's attempt, "Introduction de la Médecine dans le Latium et à Rome," *Revue Archéologique*, 3rd ser. 5 (1885): 389-392; 3rd ser. 6 (1885): 192-194, to derive the word *medicus* from the Oscan *meddix tuticus* fails etymologically (see H. Blümner, *Die römischen Privatalter-tumer* [Munich, 1911] 475, n. 10; cf. more recently the argument of G. Baader, "Der ärztlicher Stand in der römischen Republik," *Acta Conventus XI Eirene* [Warsaw, 1971] 8); the reference of Dionysius of Halicarnassus *(Ant.* 10.53) to the help of *medici* in an epidemic of 451 B.C. appears to be a rhetorical topos (see S. Reinach, s.v. "*medicus*" in *Dictionnaire des antiquites grecques et romaines*, eds. C. Daremberg and E. Saglio [Paris, 1900], 3,pt.2, 1672, n. 4); in the *Lex Aquilia* (ca. 286 B.C.) the statement which holds a *medicus*, who has been negligent in his operation, responsible for the death of a slave (*Ulp. Dig.* 9.2.7.8), is considered a later interpolation (see T. Meyer-Steineg, *Geschichte des römischen Arztestandes* [Kiel, 1907] 9, n. 5; cf. more recently, K. H. Below, *Der Arzt in römischen Recht* [Munich, 1953] 114-115); there is no available evidence to support Blümner's conjecture (op.cit., 475) that there were *medici* to treat the wounded in the early Republican army (cf. Baader, op.cit., 9).

3. Seneca, *Ep.* 95.15, comments: *Medicina quondam paucarum fuit scientia herbarum, quibus sisteretur fluens sanguis, vulnera coirent.* (Seneca *Ad Lucilium Epistulae Morales*, ed. & trans. R. Gummere [Cambridge, Mass., 1953]). The elder Cato (ca. 234-149 B.C.) yet recommends the efficacy of traditional Roman folk medicine. See *Agr.*, chpts. 114-115, 122-123, 125-127, and 156-160. On Roman folk medicine in general, see W. H. S. Jones, "Ancient Roman Folk Medicine," *JHM* 12 (1957): 459-472; J. Scarborough, *Roman Medicine* (Ithaca, New York, 1969; rpt. 1976) 15-23.

Indeed, wedded to religious mysticism and crude popular customs, the rather primitive *medicina domestica* stood out as an anachronism in an era which witnessed among the Greeks not only the growth of Hippocratism, but subsequently the pedantic and speculative erudition of Alexandria.[4] In the few remaining centuries of the Roman Republic, however, it is the translation of Greek medicine to Rome that finally leads to the emergence of a medical art and profession—albeit Greek—among the Romans.[5]

It has been conjectured—and not unreasonably—that as a result of increasing involvement in wars of conquest throughout the third century B.C., the Romans were introduced to the Greek medical art by Greek prisoners of war brought to Rome and sold as slaves to wealthy Romans,[6] and that the talents and services of these *servi medici* became an increasingly valuable complement to the *medicina domestica* advocated by their Roman masters.[7] Our discussion, however, commences with the apparent arrival of free Greek physicians *(peregrini medici)* at Rome towards the end of the third century B.C., as suggested by our oldest most reliable evidence for a *medicus* at Rome—namely the testimony of Cassius Hemina.

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4. Cf. M. Neuburger, *Geschichte der Medizin* (Stuttgart, 1906) 1:288. Why the Romans remained content with an essentially primitive folk medicine for so long a time remains a moot question. Neuburger *(ibid.*, 1: 287-288, Meyer-Steineg (note 2) pp. 1-2, and more recently J. F. Schulze, "Die Entwicklung der Medizin in Rom und das Verhältnis der Romer gegenüber der ärztlichen Tätigkeit von den anfängen bis zum Beginn der Kaiserzeit," *Ziva Antika* 21 (1971): 489 concur in conjecturing that in as much as the early Romans were essentially an agricultural folk with simple habits of life, sound and hardened constitutions, the onset of many diseases was probably prevented; consequently, there was little necessity for a highly developed medical art. Periodic outbreaks of pestilence probably only fed an already crass superstition without stimulating any quest for rational explanation. Cf. here Seneca, *Ep.* 95.15: *Nec est mirum tunc illam* (sc. *medicina*) minus negotii habuisse firmis adhuc solidisque corporibus et facili cibo nec per artem voluptatemque corrupto... (Gummere). Neuburger *(ibid.)* and Meyer-Steineg *(ibid.)* also suggest that the Romans' involvement in the constant succession of wars, which marked Rome's expansion in Italy, may have stifled any interest in the medical art—the energy and intellect of the Romans being devoted primarily to the aggrandisement of power and the consolidation of the Confederacy.

5. Notwithstanding the gradual assimilation of the Greek medical art among the Romans, the old Roman *medicina domestica* appears never to have been entirely supplanted. See Jones (note 3) and Scarborough (note 3) pp. 23-24.

6. Cf. Meyer-Steineg (note 2) pp. 10-13; J. Vogt, *Sklaverei und Humanität* (Wiesbaden, 1965) 78; J. Scarborough, "Romans and Physicians," *CJ* 65 (1970): 297; and Schulze (note 4) p. 484 *et alii.*

7. Cf. F. Kudlien, *Die Sklaven in der griechischen Medizin der klassischen und hellenistischen Zeit* (Wiesbaden, 1968) 45.

Cassius asserts that the first of the physicians *(primus e medicis)* to come to Rome was Archagathus, son of Lysanias, who migrated from the Peloponnesus in the year 219 B.C.; he was given the rights of citizenship *(ius Quiritium)*; a shop *(taberna)* at the cross-ways of Acilius was purchased at public expense for his use. Further, while Archagathus initially enjoyed considerable popularity as a "wound specialist" *(vulnerarius)*, he was soon called "executioner" *(carnifex)* because of his savage use of the knife and cautery *(a saevitia secandi urendique)*, and his profession as well as all physicians were held in contempt.[8]

Two of Cassius' remarks seem somewhat dubious. First, albeit Cassius asserts that Archagathus was the first *medicus* to arrive at Rome, Baader has recently conjectured—quite rightly I think—that Archagathus was probably but the most distinguished practitioner of the Greek medical art to arrive at this time in contrast to any number of less qualified practicing *peregrini medici*, who also had been attracted to Rome by her rise to power in the West.[9] Second, it is true that not until the first century B.C. do we again hear of another eminent free Greek physician at Rome or of any commendation paid the profession by the Romans—and even then reliable evidence is conspicuously lacking for the active participation in the profession by Roman *ingenui*.[10] Cassius' assertion, however, that the unpopular practices of one *peregrinus medicus* at the end of the third century B.C. brought the entire Greek medical profession and its practitioners thenceforth into disrepute, does seem questionable. I should like to suggest that responsibility for the apparent discrediting of the Greek medical profession among the Romans lies possibly elsewhere.

Although the Romans had been influenced to some degree by Greek civilization since the sixth century B.C., by the end of the third century they were increasingly in contact with Greek culture, aware of it, and responding to it. In the First Punic War (264-241 B.C.) the Greek cites of Sicily with their opulent and

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8. *Cassius Hemina ex antiquissimis auctor est primum e medicis venisse Romam Peloponneso Archagathum Lysaniae filium L. Aemilio M. Livio cos. anno urbis DXXXV, eique ius Quiritium datum et tabernam in compito Acilio emptam ob id publice. Volnerarium eum fuisse e re dictum, mireque gratum adventum eius initio, mox a saevitia secandi urendique transisse nomen in carnificem, et in taedium artem omnesque medicos...* (Frg. 26, H. Peter, *Historicorum Romanorum Fragmenta* [Leipzig, 1883]), quoted by Pliny, *HN* 29.12-13 (Ernout).

9. Baader. (note 2) p. 9. T. C. Allbutt, *Greek Medicine in Rome* (London, 1921; rpt. New York, 1970) 66, feels that the frequent reference of the comedy writer Plautus (ca. 259-184 B.C.) to the free Greek physician and his art suggests that there were indeed a good number of them established and practicing in Rome at the time of Archagathus' arrival, if not earlier.

I concur here with Blümner (note 2) p. 467, n. 1, that M. Wellmann, s.v. "Archagathus" in *Pauly-Wissowa's Real Encyclopädie der klassischen Altertumswissenschaft* (Stuttgart, 1893-) 2:433 (hereafter cited as R.E.), goes too far in attributing the tradition that Archagathus was the first physician in Rome solely to the fact that his name means "good beginning" (arche plus agathos).

10. See note 37 and accompanying text of this paper. Cf. Pliny, *HN* 29.11: *...medicinae vero etiam avidus* (sc. *populus Romanus), donec expertam damnavit.* (Ernout)

artistic culture had ranged themselves on the side of Rome against Carthage; relations with the Greeks of the mother country were forged when in the First Illyrian War (229 B.C.) Rome put herself forward as champion of the Greeks. This deed initiated a pro-Hellenic policy that would soon lead to the Roman liberation of the Greeks in 196 B.C.

It was inevitable that the Romans would react variously to aspects of Greek culture with interest and disinterest, approval and disapproval, involvement and rejection. The practices and opinion of the elder Cato, one of the most influential, respected, and outspoken statesmen of this period and an upper class conservative, suggest his especially strong reaction against—if not total rejection of—Greek medicine and the influx of its practitioners in favor of the traditional Roman *medicina domestica*. Cato remained adamant on the efficacy of traditional and familar folk remedies, as is readily indicated by numerous chapters of his *De Agri Cultura*;[11] according to Pliny *(HN* 29.15*)*,[12] he had a notebook of recipes *(commentarius)* by the aid of which he treated his son, servants, and household in his capacity as *pater familias*. The advice he gave his son, Marcus, regarding Greek *medici* and their art was as follows:

> I shall speak about those Greeks in their proper place, Marcus my son, as to what I know as the result of my inquiries at Athens, and I shall demonstrate what benefit there is in looking into their literature, but not in studying it thoroughly. Theirs is an utterly vile and unruly race; and consider that this is said by a prophet: when that race gives us its literature it will corrupt everything, and all the more so if it sends us its doctors. They have taken an oath among themselves to kill all barbarians by their medicine, and this very thing they do for a fee, so that they should be trusted and may destroy with ease. They constantly speak of us too as barbarians, and they insult us more filthily than others by calling us Opici. I have forbidden you to have dealings with doctors.[13]

Obviously account must be taken here of Cato's propensity for expressing himself in colorful hyperbole: it is unlikely that he actually believed in the general oath to kill all barbarians or in the devious motive for charging fees.[14]

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11. See note 3.

12. *...profiteturque* (sc. Cato) *esse commentarium sibi, quo medeatur filio, servis, familiaribus...* (Ernout).

13. *Dicam de istis Graecis suo loco, M. fili, quid Athenis exquisitum habeam et quod bonum sit illorum litteras inspicere, non perdiscere, vincam. Nequissimum et indocile genus illorum, et hoc puta vatem dixisse: quandoque ista gens suas litteras dabit, omnia conrumpet, tum etiam magis, si medicos suos hoc mittet. Iurarunt inter se barbaros necare omnes medicina, et hoc ipsum mercede faciunt ut fides is sit et facile disperdant. Nos quoque dictitant barbaros et spurcius nos quam alios opicon appellatione foedant. Interdixi tibi de medicis.* (Frg. 1, H. Jordan, *M. Catonis praeter librum de re rustica quae exstant* [Leipzig, 1860]). Quoted by Pliny, *HN* 29.14; cf. Plutarch, *Cato Mai.* 23.2. I use the translation of A. E. Astin, *Cato the Censor* (Oxford, 1978) 171.

14. Astin (note 13) p. 172. However, F. Kudlien, "Medical Ethics and Popular Ethics in Greece and Rome," *Clio Med.* 5 (1970):98, feels that such prejudiced disqualification of physicians as being killers—as is suggested by Cato's statement—may have helped to make the entrance into Rome particularly difficult for Greek medicine.

Nevertheless, it is not unreasonable to conjecture that underlying Cato's statement is his angry repudiation of those who doubtless came along in number with the competent *peregrini medici*—namely, the ill-trained and the charlatans, greedy of gain and little troubled by conscientious scruples, who traded upon the credulity of the Romans.[15] Needless to say, such outspoken criticism as Cato's—and we assume that of others of similar disposition—could not but have contributed adversely to the general reputation of Greek medical practitioners at this time.

Another likely cause for the discrediting of the Greek medical profession among the Romans, which is equally or more important because of its enduring effect throughout Republican times and thereafter, is the socially inferior position which the representatives of the Greek medical profession necessarily occupied in their Roman environment. The stigma of servitude or former servitude marked respectively the *servi medici* and the *liberti medici* (i.e. manumitted slave physicians); the *peregrini medici*, as foreigners, were considered basically rightless, dutiless, and outside the pale of strict Roman law.[16] Also, as Baader has recently noted with regard to Plautine comedy, the *medicus* was early characterised as a *faber* or artisan with all the debasing connotations which that social status evoked in the Roman mind.[17]

Given the silence of the sources, it remains a moot question as to what extent the Greek medical profession persevered in its Roman environment throughout the second century B.C.—a period wherein generally the opponents of Hellenism gradually gave way to the champions of Greek culture.[18] At any rate the numerous

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15. Cf. Neuburger (note 4)1:291.

16. See especially here H. F. Jolowitcz, *Historical Introduction to the Study of Roman Law* (Cambridge, 1965) 71 and chpt. 6, "Law for foreigners, *ius gentium* and *ius naturale*," 100-105. D. W. Amundsen and G. B. Fergren, "The Forensic Role of Physicians in Roman Law,"*BHM* 53 (1979) :39-56, recently concluded (p. 52) that "...there is lacking any specification of the forensic employment of physicians as a mandatory procedure or any recognition of forensic status for physicians in Roman law." I suggest that the legal status of the *peregrinus medicus* certainly for the Republican period may very well account for the situation.

17. Baader (note 2) pp. 9-11. Cf. P. Menière, *Études Médicales sur les Poètes Latins* (Paris, 1858) 32-76.

At the end of the Republic, Varro (*Ling.* 5.93) still classifies the medical profession as among the artisan professions, which, according to his contemporary Cicero (*De Off.* 151), were unbecoming for the Roman citizen to pursue. See concluding page of this article.

18. According to Pliny, *HN* 29.16 (cf. 29.20), a decree was supposedly published some time after Cato's death ordering the banishment of all Greeks from Italy, but expressly directed towards the Greek physicians. If there was indeed such a decree, its effectiveness, as Neuburger remarks (note 4) 1:298, was certainly questionable.

references of the eminent statesman Cicero (ca. 106-43 B.C.) to *medici (peregrini, liberti,* and *servi)* suggest that the profession was well represented by Greek practitioners and flourishing in the first century B.C.[19]

Indeed, Cicero proves to be a particularly valuable source of commentary on the medical practitioner and his profession at the end of the Republic.[20] The *medicus* was expected to acquire mastery of his art through experience and practice.[21] He was to be familiar with the structures of the human body; dissection apparently was practiced.[22] The function of the physician was to treat the patient in a manner suited to heal him, the aim, of course, being to heal by means of the treatment.[23] He received for his services an honorarium.[24] The best representatives of the

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19. Cicero himself comments, *Att.* 15.1.1: *Quid mihi iam medico? Aut, si opus est, tanta inopia est?* (Cicero *Letters to Atticus*, ed. & trans. E.O. Winstedt [Cambridge, Mass., 1918; rpt. 1961]).

peregrini medici: eg. Asclepiades of Bithynia (Cic. *De Or.* 1.14.62); Artemidorus of Perga (Cic. 2 *Verr* 3.54); Philotas of Amphissa (Plut. *Ant.* 28). Cf. here S. Treggiari, *Roman Freedmen during the late Republic* (Oxford, 1969) 130. Perhaps also Cleophantus (Cic. *Clu.* 47), according to Treggiari, p. 131 n. 11.

liberti medici: e.g. Glyco, the physician of Pansa (Cic. *ad Brut.* 1.6.2) and Craterus, the physician of Atticus (Cic. *Att.* 13.1, 14.4; Hor. *Sat.* 2.3.161). Cf. Treggiari, op.cit., p. 131 n. 10. Metrodorus, a physician who attended Tiro at Tusculum (Cic. *Fam.* 16.20) and Alexio, the personal physician of Cicero (Cic. *Att.* 15.1.1, 15.2.4) could have been, according to Treggiari, either *liberti or peregrini.* Baader (note 2) p.16 adds Cleanthes, the physician to Cato Uticensis (Plut. *Cat. min.* 70.3) and also Asclapo (Cic. *Fam.* 13.20), But cf. Vogt (note 6) p.80, who regards Asclapo as a *peregrinus.* It is interesting to note here that of the three epigraphically transmitted names of physicians for the Republic, two are names of freedmen, Pamphilus (CIL I 1319) and Menecrates (CIL I 1684), and one, Praxagoras (CIL 1713), appears to have been an adopted older slave. Cf. here Baader, (note 2) p.11; also, Treggiari, *ibid.,* p.131 n. 10.

servi medici: e.g. Phidippus (Cic. Deiot. 17), Straton (Cic. *Clu.* 176), and Diogenes (Cic. *Clu.* 47). Cf. here Baader, (note 2) p. 16.

20. E. Orth, Cicero und die Medizin (Leipzig, 1925) and J. Meinecke, "The Medical Conceptions of a Roman Layman," *CJ* 41(1945):113-118.

21. Cic. *Off.* 1.18.60: *Sed ut nec medici nec imperatores nec oratores, quamvis artis praecepta perceperint, quicquam magna laude dignum sine usu et exercitatione consequi possunt, sic officii conservandi praecepta traduntur illa quidem, ut facimus ipsi, sed rei magnitudo usum quoque exercitationemque desiderat.* (Cicero *De Officiis*, ed. & trans. W. Miller [Cambridge, Mass., 1913; rpt. 1938]).

22. Cic. *Acad.* 2.39.122: *Corpora nostra non novimus, qui sint situs partium, quam vim quaeque pars habeat ignoramus; itaque medici ipsi, quorum intereat ea nosse, aperuerunt ut viderentur, nec eo tamen aiunt empirici notiora esse illa, qui possit fieri ut patefacta et detecta mutentur.* (Cicero. *De Natura Deorum. Academica,* ed. & trans. H. Ruckham [Cambridge, Mass., 1933]. Cf. Cic. *Tusc.* 1.20.46. On human dissection in Roman medicine, see Scarborough (note 3), Appendix III, pp. 168-170.

23. Cic. *Inv. Rhet.* 1.5.6: *Ut medici officium dicimus esse curare ad sanandum apposite, finem sanare curatione, item, oratoris quid officium...* (Cicero *De Inventione,* ed. & trans. H. Hubbell [Cambridge, Mass., 1949; rpt. 1960]).

24. Cic. *Fam.* 16.14.1: *Medico mercedis, quantum poscet, promitti iubeto. Id scripsi ad Ummium.* Cf. Cic. *Fam.* 16.4.2:. *Medico ipsi puto aliquid dandum esse, quo sit studiosior.* (Cicero *The Letters to His Friends,* ed. & trans. W. Glynn Williams [Cambridge, Mass., 1929; rpt. 1960]). On the Roman concept *honorarium*, see F. Kudlien, "Medicine as a 'Liberal Art' and the Question of the Physician's Income," *JHM* 31 (1976) : especially 456-458.

profession were highly esteemed for their skill, as well as their friendship:[25] Cicero praises the medical knowledge, reliability and good will of the *medicus* Asclapo;[26] he laments the death of his personal physician Alexio—he has lost a good physician, but he will miss also the man's respect, humanity and charm.[27] Needless to say, there were plenty of inept physicians, who did not hesitate to profess mastery of the art.[28] There were also those physicians who allowed themselves to become accomplices in heinous crimes when for a fee they opened veins[29] and provided poison.[30]

The most eminent and popular physician appears to have been an older contemporary of Cicero, the *peregrinus medicus* Asclepiades of Bithynia, who seems to have begun practicing his art in Rome around 91 B.C.[31] Unfortunately, biographical details of his life are scant and conflicting, none of the many writings attributed to him have survived intact, and considerable caution must be exercised in drawing conclusions from extant fragments which comprise only a fraction of

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25. As Treggiari, (note 19) p.130, comments, any Roman of standing (e.g. Caesar [Suet. *Iul.* 4]; Piso [Cic. *Har. Resp.* 35; *Pis.* 83]; Cicero [*Att.* 15.1.1]) had his own personal physician as part of his household to attend on himself and his family.

26. Cic. *Fam.* 13.20: *Asclapone Patrensi, medico, utor valde familiariter, eiusque cum consuetudo mihi iucunda fuit, tum ars etiam, quam sum expertus in valetudine meorum; in qua mihi cum ipsa scientia, tum etiam fidelitate benevolentiaque satisfecit. Hunc igitur tibi commendo...* (Williams)

27. Cic. *Att.* 15.1.1: *O factum male de Alexione! Incredibile est, quanta me molestia adfecerit, nec mehercule ex ea parte maxime, quod plerique mecum: "Ad quem igitur te medicum conferes?"... Amorem erga me , humanitatem suavitatemque desidero.* (Winstedt)

28. Cic. *Fam.* 4.5.5.: *noli...imitari malos medicos, qui in alienis morbis profitentur tenere se medicinae scientiam, ipsi se curare non possunt.* (Williams)

29. Cic. *Clu.* 61; *Pis.* 83; *Har. Resp.* 35.

30. Cic. *Deiot.* 17; *Clu.* 47; 176.

31. According to Cicero, *De Or.* 1.14.62, Asclepiades was a friend of Lucius Licinius Crassus (cos. 95 B.C.; d. 91). See here especially the discussion of Orth (note 20) p. 109.

On Asclepiades' fame, Celsus comments, *Med. Pr.* 11: *...nullo vero quicquam post eos, qui supra comprehensi sunt, agitante, nisi quod acceperat, donec Asclepiades medendi rationem ex magna parte mutavit.* (Celsus *De Medicina*, ed. & trans. W. G. Spencer [Cambridge, Mass, 1935; rpt. 1960]). Cf. Pliny, *HN* 26.13 : *...universum prope humanum genus circumegit in se non alio modo quam si caelo demissus advenisset* (sc. Asclepiades).

Pliny, however, does not hesitate to malign Asclepiades severely for charlatanry (cf. especially *HN* 26.12; 14-17). It is generally held now that Pliny's view is a prejudicially distorted one in light of Asclepiades' considerable influence upon Caelius Aurelianus, Celsus, and Galen. See M. Wellmann, "Asclepiades aus Bithynien von einem herrschenden Vorurteil befreit," *Neue Jahrbücher für das klassische Altertum* 21 (1908): 684-703, and more recently, A. Gervais, "Que pensait-on des médecins dans l'ancienne Rome?" *Bull. Ass. Guillaume Budé* 4th ser. (1964): 201; Scarborough (note 3) pp. 38-40; Baader (note 2) pp. 14-15; and Schulze (note 4) p. 496 *et alii*. For the opposite opinion, see J. Ilberg, "A. Cornelii Celsus und die Medizin in Rom," *Neue Jahrbücher für das klassische Altertum* 10 (1907): 408.

his whole work.[32] It is generally held, however,[33] that Asclepiades promoted a materialistic, anti-teleological system of medicine derived partially from Epicurean atomism, then in vogue, and partially from the quasi-atomistic teaching, now lost, of Heraclides of Pontus; that he rejected the humoralism of the Hippocratic tradition in favor of his own speculative mechanical physiology and solidist pathology (disease resulted from an abnormal arrangement of atoms relative to the pores which constituted the physical basis of the body; health was the restoration of the atomic constituents to their normal state). His goal as a physician was to cure "safely, swiftly and pleasantly"[34] by recourse principally to diet, exercise, massage and baths, along with the circumspect use of drugs,[35] surgery, the enema, and venesection.

Despite the apparent emergence and growth of the Greek medical profession in its Roman environment, the stigma of social inferiority yet persisted at the end of the Republic. Cicero includes medicine along with architecture and teaching among the liberal arts *(artes liberales)*: they represented professions in which a higher degree of intelligence *(maior prudentia)* was required and from which no small benefit to society *(non mediocris utilitas)* was derived. Cicero, however, adds that these professions were only proper for those "whose social position they become" *(eae sunt iis, quorum ordinii conveniunt, honestae)*—the medical profession was an acceptable means of earning one's living, but not for Roman *ingenui*,[36] and indeed, there proves to be little reliable evidence for their

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32. On Asclepiades, see especially M. Wellmann, *R. E.* s.v. "Asklepiades," 1632-1633, and his "Asclepiades aus Bithynien..." (note 31), which remains the best modern treatment. A complete collection of fragments, commenced by C. G. Gumpert, *Asclepiadis Bithyni Fragmenta* (Weimar, 1794), has yet to be accomplished. R. M. Green, *Asclepiades: His Life and Writings* (New Haven, 1955) provides an English translation of A. Cocchi's *Discorso primo sopra Asclepiade* (Florence, 1758; rpt. as *Discorso secundo* in *Antologia Fiorentina,* Milan, 1824) and Gumpert's fragments.

33. See here especially M. I. Lonie, "Medical Theory in Heraclides of Pontus," *Mnemosyne* 18 (1965) :126-143; W. A. Heidel, "Antecedents of Greek Corpuscular Theories," *Harvard Studies in Classical Philology* 22 (1921) :111-172; and Heidel's, "The ἄναρμοι ὄγκοι of Heraclides and Asclepiades," *Transactions of the American Philological Association* 40 (1909) :5-21.

34. Celsus, *Med.* 3.4: *Asclepiades officium esse medici dicit, ut tuto, ut celeriter, ut iucunde curet.* (Spencer) Lonie, (note 33) p. 126, aptly comments here that "the physician and medical scientist Asclepiades of Bithynia was distinguished by two qualities not invariably found in the history of Greek medicine: compassion and commonsense."

35. On Asclepiades' drug therapy, see especially J. Scarborough, "The Drug Lore of Asclepiades of Bithynia," *Pharmacy in History* 17 (1975) :43-57.

36. Cicero, *De Off.* 1.42.151: *Quibus autem artibus aut prudentia maior inest aut non mediocris utilitas quaeritur, ut medicina, ut architectura, ut doctrina rerum honestarum, eae sunt iis, quorum ordini conveniunt, honestae.* (Miller) See Treggiari (note 19), "The Learned Professions and the Fine Arts," pp. 110-142; Kudlien (note 24). Cf. Schulze (note 4) p. 498; Meyer-Steineg (note 2) p. 20.

involvement in the profession.[37]

As the Republic drew to a close, the Romans' continued reluctance to participate in the Greek medical profession, ironically enough, may have abetted its advancement. In 46 B.C. Julius Caesar enacted a decree whereby, according to Suetonius:

> He conferred citizenship on all who practiced medicine at Rome, and on all teachers of the liberal arts, to make them more desirous of living in the city and to induce others to resort to it.[38]

It has been conjectured variously that Caesar was prompted by the necessity of remedying an inadequate supply of physicians for an explosively growing population,[39] or for his army.[40]

Notwithstanding the debatable nature of Caesar's motivation in enacting the decree of 46 B.C., it is of considerable importance that the medical profession—albeit Greek—was finally accorded official recognition by the Roman state. Indeed, its emergence in the Roman Republic was complete, and a fundamental condition for its subsequent growth and development in the Empire was insured—namely the legal equalization of the free Greek physician and the Roman *ingenuus*.[41]

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37. Cf. Pliny, *HN* 29.17: *Solam hanc* (sc. *medicinam*) *artium Graecarum nondum exercet Romana gravitas, in tanto fructu paucissimi Quiritium attigere et ipsi statim ad Graecos transfugae*...(Ernout). As Treggiari, (note 19) p. 129, comments such physicians as Antistius (*Suet. Iul.* 82), A. Rupilius (Cic.*Clu.* 176) and L. Tuccius (Pliny, *HN* 8.183) were more likely to have been enfranchised immigrants or freedmen, not freeborn Romans. Cf. here Below (note 2) p. 20 and Orth (note 20) p. 22.

38. Suetonius, *Iul.* 1.42.1: *Omnisque medicinam Romae professos et liberalium artium doctores, quo libentius et ipsi urbem incolerent et ceteri adpeterent, civitate donavit.* (Suetonius, ed. & trans. J. C. Rolfe [Cambridge, Mass., 1914; rpt. 1924]).

39. See Kudlien (note 7) p. 45; more recently Baader (note 2) p. 17.

40. See J. Marquardt, *Römische Statsverwaltung* (Darmstadt, 1957) 566; more recently, Baader (note 2) p. 17. Given the scantiness of the evidence, however, it is impossible to determine the specific position of the *medici* in the republican army. See here V. Nutton's excellent discussion, "Medicine and the Roman Army: A Further Reconsideration," *Medical History* 13 (1979) :266-270; especially 266-267, where I concur with Nutton that the evidence of Cicero, *Tus. Dis.* 2.38, posits clearly the existence of *medici* who attended the wounded and whose aid was expected and sought by those in need, that the presence of the *medicus* and his general acceptance may indicate more than a mere 'de facto' medical service (albeit not a corps of physicians), and that possibly there was provision for *medici* other than the personal physicians of the wealthy and a 'formal' recognition of the position of the *medicus*.

41. See most recently here the discussion with bibliography of K. Fischer, "Zur Entwicklung des ärztlichen Standes im römischen Kaiserreich," *Medizin Historisches Journal* 14 (1979) :165-175.

Cosmology and Physiology in Galenic Visual Theory: Ḥunayn Ibn Isḥāq*

BRUCE STANSFIELD EASTWOOD

ḤUNAYN ibn Isḥāq (808-873), of Arabic tribal background and connected to the Syrian Nestorian church, was the most brilliant and successful of the early translators of Greek learning into Syriac and Arabic.[1] In addition to his works of translation, Ḥunayn's own writings on medicine exercised influence in the Arabic and Latin worlds. While his most popular work was the *Questions on Medicine*, another book entitled *Ten Treatises on the Eye*[2] became a widely known source for physicians and ophthalmologists. This work is ostensibly a book dealing with visual theory, classification of ocular diseases, and treatments for the eye. However, the book also contains, both implicitly and explicitly, cosmological doctrines upon which the visual theory rests.

Hunayns' theory of vision is, in fact, a theory of the cosmological natures of the pathway from the brain to the perceived object. His theory is not a mechanical theory—there are no mechanisms involved—nor is it a causal theory in the usual modern sense of that word. More specifically, the theory is not even a functional theory, insofar as "function" denotes activity and efficient causality. We may however consider it a functional theory in a teleological sense, using final causality. Rather than *acting* in a modern physiological sense, the parts of the eye simply *are* beings with natures. Every nature has its end, or goal, built into it and thereby permits or enables certain results to occur. The results, in turn, are predetermined in general, but not always specifically, by Nature. (Specific variation or prevention of natural results occurs because of hindrances, such as disease or injury.) Hunayn's doctrine of natures, derived from cosmological principles and applied to the microcosm of the eye and vision, is in no way original with him. It is Galenic in character and, like much of Galen's thinking, even pre-Galenic in origin; but Hunayn appears to derive the principles of his microcosmology of vision directly from Galen's writings. The essential doctrines in this cosmology are four.

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1. Biographical information and studies of Ḥunayn as translator and physician appear in Georges C. Anawati and Albert Z. Iskandar, "Ḥunayn ibn Isḥāq al-ʿIbādī," *Dictionary of Scientific Biography*, ed. C. C. Gillespie (New York: Scribners, 1978), Suppl. I. (vol. 15) pp. 230-249.

2. Max Meyerhof (ed.), *The Book of the Ten Treatises on the Eye Ascribed to Hunain ibn Is-ḥāq (809-877 A.D.)* (Cairo: Government Press, 1928). Meyerhof's translation is generally quite dependable and is the basis for most of my analysis of Ḥunayn's theory. This book will be referred to hereafter as "Ḥunayn" with page numbers for the English translation.

1. Structural order—the arrangement of the parts of the eye reflects a cosmic harmony; that is, each part is a connection between two other parts whose natures are sufficiently dissimilar to require an intermediary, and the order of contiguous parts establishes relationships that allow every part to fulfill its natural purpose.
2. Medical teleology—every part, by its nature, has purposes, sometimes more protective, sometimes more effective; the reason for existence of each part is determined primarily by the ultimate purpose, vision, and secondarily by the more immediate natures which dictate how the ultimate purpose will best be served.
3. The four elements—each element is related to one of the senses (the fifth sense based on a combination of two elements), and the capabilities of each sense are outlined in terms of the relevant element(s).
4. The four qualities—subordinate to the doctrine of the four elements, this doctrine appears in Ḥunayn's work primarily as a doctrine of the qualities of the purest form of elemental fire, light, whose essential characteristic is luminosity. Other qualities than those of light apply to other parts of the eye as well as to other senses. Galen and Ḥunayn also deal in a much greater spectrum of qualities than the basic four (hot—derivatively, luminous— cold, wet, dry); the additional qualities come from actual observations via dissection. However, these additional qualities will still be found to fit within and to support the ordered structure of parts, which Ḥunayn sets forth so carefully.

While all these doctrines are essential to Ḥunayn's theory, the doctrine of the elements provides the direction for the development of his discussion. The other doctrines support and extend the correspondences based on the doctrine of the four elements. The "elements" of Ḥunayn's theory of vision show us a miniature (a micro-analysis) of principles that order the cosmos. This microcosmology is not simply a rhetorical framework for independent, "scientific" teachings but is the framework which gives meaning to the scientific teachings of Ḥunayn on vision. The structural order of Ḥunayn's theory is one of the more notable modifications of Galen's discussions of vision.[3] Although Galen is quite clear about the succession of the parts of the eye, he does not always give the exact location of each part.[4] Ḥunayn reiterates Galen's concern for empirical

3. Structure is the leitmotif of tract 1 of the *Ten Treatises*, treating the anatomy of the eye; Ḥunayn pp. 3-14.

4. This is especially so in Galen's discussion of the lens, which he locates clearly enough between the aqueous and vitreous humors and with the arachnoid membrane as a tunic covering its anterior surface; Galen does not say just how far from the forward surface of the eye the lens is placed. See Galen, *De Usu Partium Libri XVII* ed. Georg Helmreich (Leipzig: Teubner, 1909), 2: 70-71, 75; trans. Margaret T. May, *On the Usefulness of the Parts of the Body* (Ithaca: Cornell U.P., 1968), 2: 475, 478-479. All but one of the works hereafter cited appear in modern editions; references to Kühn's edition are given to facilitate reference: see *Claudii Galeni Opera Omnia*, 20 vols., ed. Karl Gottlob Kühn (Leipzig: Knobloch, 1821-1833), vol. III, 780-781, 787.

correctness in the relative position of the eye's parts and then adds a distinctive argument concerning the number of true ocular tunics. The discussion is framed within a Galenic ordering which is given a thorough-going symmetry both in Ḥunayn's explication and in the diagrams added to his text in the twelfth century (Figure 1 [a]). The diagrams show the layers of the eye as neatly concentric circles

Figure 1(a). Schema of the eye according to Cairo ms. Ṭibb Taimūr 100, p. 314 (ref. note 5).

and arcs of circles, all centered on the lens.[5] These later diagrams appear to reflect correctly the intentions of the text in its discussion of the positions of the tunics. Ḥunayn's conclusion is that symmetry favors the number six, not seven. He

5. The earliest illustrated manuscript is dated to A.D. 1196. See the photograph in Ḥunayn, opposite p. 74(Arabic text), Figure 1; also in Stephen L. Polyak, *The Vertebrate Visual System* (Chicago, 1957), p. 16, Figure 2.

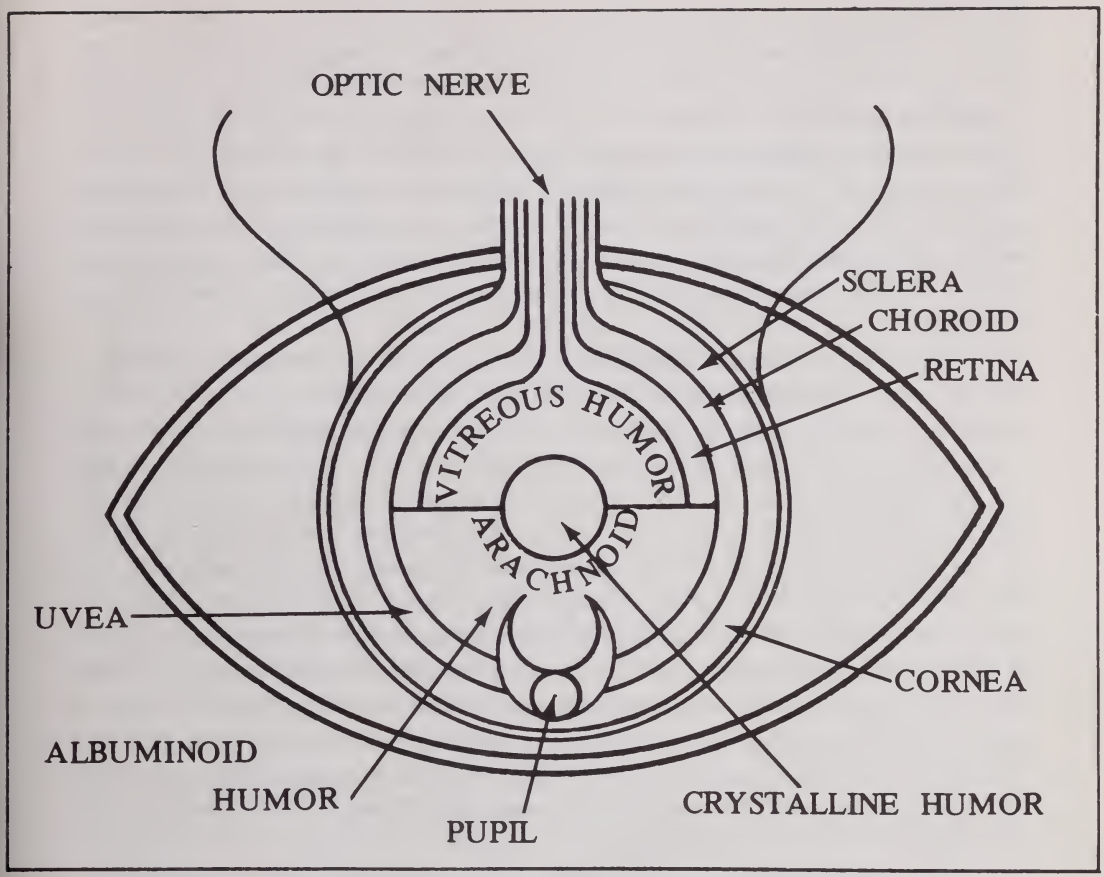

Figure 1(b). Schema of the eye as reconstructed by David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago, 1976), p. 35, fig. 5, by permission of The University of Chicago Press. ©1976 by the University of Chicago. All rights reserved.

teaches (Figure 1[b]) that there is a central lens with three tunics (plus one humor) in front of and again behind the lens. In order to support this view he must argue against one of the traditional tunics in front of the lens—arachnoid membrane, uvea, cornea, conjunctiva. To match the trio of retina, choroid, and sclera behind the lens, he disagrees with Galen on the arachnoid membrane. It is, Ḥunayn says, not a true tunic but only a part of the lens itself.[6] Thus we have the tunics conjunctiva, cornea, and uvea in front of and the tunics retina, choroid, and sclera behind the lens. The aqueous and vitreous humors, anterior and posterior to the lens, complement this symmetry. Spatially Ḥunayn adds again to Galen by making the lens not only the focal part of the eye, for which the others exist, but

6. Ḥunayn, pp. 4, 10-12. Cf. Galen, *On Anatomical Procedures*, trans. Duckworth, Lyons, Towers, (Cambridge: Cambridge U.P., 1962), pp. 40-43.

also the geometrical center of the eye. Finally, Ḥunayn shows how the symmetrical structure of the eye is best suited to the purposes of its parts. The lens is of central importance, for it is a terminus of the sight canal, through which visual pneuma flows from brain to eye.[7] Every other part of the eye has both a protective and an effective function, though Ḥunayn's emphasis may fall more on the protective in a case like the vitreous, which feeds the lens with a nutriment especially suited to the nature of the lens,[8] and on the effective in a case like the retina, which contains and transmits the visual pneuma between the brain and the lens.[9] All these purposeful functions insure a healthy and effective visual process.

Essential to an understanding of this medical teleology is an understanding of the process of nutrition used by Galen and Ḥunayn. In the eye nutrition is involved in maintaining, or protecting, the parts, especially the lens. For the lens to be fed, it must be given a substance which is similar to its own nature. The nature of the lens, says Ḥunayn, is white, transparent, and luminous. Since the blood is not close to this nature, an intermediate body such as the vitreous humor is needed to change the blood to a more suitable substance. Yet nothing is said about any efficient cause for this change. We have only the final cause, elaborated by the Galenic idea of coction, through which this change takes place. Coction is simply a process of changing through a number of intermediate steps. Change from one substance to another, quite distinct substance takes place by a series of very small changes in which each step comes *close to* preserving continuity. Through many slight breaks in continuity there occurs a cumulative and finally distinct discontinuity. The mechanism is never identified, but coction of this sort is important in Galenic physiology, for example, in the change from vital pneuma to psychic pneuma and in the change from air to nutriment. Through the teleological process of coction the blood is changed into a substance appropriate for, that is, similar to, the nature of the lens in the eye.[10]

For the lens and, in fact, for the whole sense of vision, one of the four elements is always most appropriate. Fire, air, water, and earth are apportioned among the five senses in a manner showing that both the objects and the organs of sensation are conceived in an ordered hierarchy. From the coarsest sense, taste, to the most delicate and subtle sense, vision, there is a corresponding elemental makeup passing from earth to fire. Touch is earthlike; taste is watery; hearing is airlike; vision is fiery.[11] Only smell depends upon a combination of two elements, air and

7. In this Ḥunayn follows Galen, *De Usu Partium,* ed. Helmreich 2:56-57, 59, 384-385; trans. May, 2: 465, 467, 686-687; K III 762, 765-766; IV 275-276. Also Galen, *De Placitis Hippocratis et Platonis,* ed. Iwan Müller (Leipzig: Teubner, 1874), p. 620; K V 622-623.

8. Ḥunayn, p. 6.

9. *Ibid.*, p. 8.

10. Galen, *De Usu Partium,* ed. Helmreich 1: 392, 393-394; trans. May, 2: 346, 347; K III 540, 541-542, Also *De Placitis,* Müller, p. 605; K V 608.

11. Ḥunayn, p. 16.

water according to the Platonic tradition used and extended by Galen.[12] The fire upon which vision depends is only the purest form of fire, a visual pneuma, whose qualities are those of light, not heat or grosser sorts of fire.

The luminosity of the lens, of the visual pneuma, and of the exterior sunlight, serves to interrelate the essential components of vision, each of which shares in the quality of pure fire. The actual coming-to-be of visual sensation occurs through an establishment of likenesses, related to the cosmological viewpoint which accepts the idea of coction. When the same qualities can be found in all the media between sense organ and sensed object, sensation can take place. Thus, luminosity, a characteristic peculiar to the element fire (and to its purest form, light), is established as a characteristic of visual pneuma, which creates a medium between the brain and the object seen.[13] In his extended discussion of the process of vision Ḥunayn focuses on the visual pneuma, the extremely subtle matter responsible for effecting vision. It is even reasonable to characterize Ḥunayn's whole theory of vision as a doctrine successively of the containing structure, the production, and the activity of visual pneuma.[14] In his elaboration of the workings of visual pneuma, two conceptions are of special importance in understanding Ḥunayn's visual theory: first, the idea that vision occurs only with the establishment of a completely unified medium from the brain to the perceived object, a pneumatic continuum with the qualities of the visual pneuma. Visual perception then occurs by a sudden transmission of sensation, as if the pneumatic continuum were a continuous nerve from brain to object. What happens here is only implied by Ḥunayn[15] and partially explicit in Galen.[16] The visual pneuma, which fills the canal which Galen (and some earlier anatomists) supposed to exist

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12. Plato, *Timaeus*, 66 D-E; John I. Beare, *Greek Theories of Elementary Cognition* (Oxford: Clarendon Press, 1906), pp. 141-144. Galen deals with the subject in four of his treatises, preeminently *De instrumento odoratus*, ed. Jutta Kollesch (Berlin: Akademie Verlag, 1964), pp. 38-40; K II 862. On the peculiarities of Galen's and of Ḥunayn's doctrines on the sense of smell, see my "Galen on the Elements of Olfactory Sensation," *Rheinisches Museum* (forthcoming).

13. Ḥunayn, pp. 27-28, 31.

14. Thus the first three (the theoretical) tracts of Ḥunayn's *Ten Treatises* deal exclusively with the eye's anatomy (containing structure), the brain (producer of visual pneuma), and the complete process of vision (activity of visual pneuma); see Ḥunayn, pp. 3-14, 15-19, 20-39.

15. Ḥunayn, p. 37.

16. The Galenic notion involves a doctrine of *tonos* with suggestions of the Stoic doctrine of *tonos* but no true identity. For Galen's discussion of *tonos* see his *De motu musculorum*, ed Kühn IV 403; trans. Charles M. Goss, "On Movement of Muscles by Galen of Pergamon," *American Journal of Anatomy* 123 (1968) :1-25, esp. 9-11. Also *De Placitis*, ed. Müller, pp. 625, 642-643; K V 627, 642-643. See David E. Hahm, *The Origins of Stoic Cosmology* (Columbus: Ohio State U.P., 1977), p. 183, n. 77.

in the soft nerve of the retina between brain and eyeball,[17] suffuses farther to the anterior portion of the eye and comes into contact with the outside world, the air. The visual pneuma then "strikes" the outside medium, and it becomes similar in quality (luminosity) to the visual pneuma.[18] Hence we have a unified pathway all the way from brain to object—a pneumatic continuum, permitting luminous sensation through itself. The second conception is the idea that visual perception is in and throughout the visual pneuma. This requires us to realize that while light rays are a part of vision in Ḥunayn's theory, they do not give the most important characteristics of vision in such a theory. If vision and visual rays naturally follow straight lines, rectilinearity and geometry are nevertheless not essential characteristics of visual rays as such. Both Galen and Ḥunayn make use of geometrical optics in explaining the shape of the lens[19] and the passage of visual pneuma within the eye.[20] However, neither writer considers light or visual pneuma to be characteristically rectilinear in the same way as each is luminous. Light and visual pneuma are essentially luminous; they are secondarily rectilinear,[21] even though this secondary nature of light is found throughout Nature. The application of geometrical reasoning to vision simply shows the purposeful economy of Nature. The pneumatic nature is what is central to visual rays. This nature is present indifferently throughout the pneumatic medium. Most strikingly, this means that parts of the eye such as retina and lens are instrumental only in maintaining a complete and undistorted pneumatic continuum. Careful reading of both Galen and Ḥunayn reveals that neither makes the retina photosensitive[22] and neither considers the lens as the unique or privileged place of visual sensibility.[23] What is special about the lens is that it is an anatomically fixed part of the visual apparatus with the same luminous nature as the fluid visual pneuma. The lens simply defines the end of the anatomical brain-retina-lens unit and connects the visual pneuma to the forward parts of the eye.[24] The lens is commonly mentioned in Galenic and Arabic writings on vision as a part with a special function and a part where perception takes place.[25] The lens

17. Ḥunayn, pp. 7, 8, 35; Galen, *On Anatomical Procedures*, trans. Duckworth, Lyons, Towers, pp. 187-188.

18. Ḥunayn, pp. 34, 37; cf. Galen, *De Placitis*, ed. Müller, p. 625; K V 627.

19. Ḥunayn, pp. 3-4. Galen, *De Usu Partium*, ed.Helmreich 2: 76, 111-113; trans. May, 2: 479, 502-503; K III 788-789, 838-841.

20. Ḥunayn, pp. 25-26. Galen, *De Usu Partium*, ed. Helmreich 2: 104-105; trans. May, 2: 498-499; K III 829-831.

21. Ḥunayn, pp. 37-38; Galen, *De Placitis*, ed. Müller, p. 633; K V 634.

22. Ḥunayn, pp. 4, 8, 28-29. Galen, *De Usu Partium*, ed. Helmreich, 2: 56-57, 383-384; trans. May, 2: 465, 686; K III 762; IV 274-275.

23. Ḥunayn, pp. 4, 28-29, 38-39. Galen, *De Placitis*, ed. Müller, pp. 642-643; K V 642-643.

24. Galen, *De Usu Partium*, ed. Helmreich 2: 56-57, 59; trans. May, 2: 465, 467; K III 762, 765-766.

25. For example, David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976), pp. 40-41, 51, 54-56.

becomes *a* place inclusively rather than *the* place exclusively for visual perception to occur. This realization on our part takes us back to one of the most basic aspects of Ḥunayn's visual theory—that his (and Galen's) explanation of vision is built upon a doctrine of natures and final causes, not mechanisms and efficient causes. The lens simply *is* a certain nature. It does not *do* anything.[26]

In essence, the doctrine of vision found in Galen and, with modifications, in Ḥunayn is a teleological description. It shows how the parts of the eye and the visual media are best suited to perform their functions. The goal of vision rather than the mechanical means of performance is uppermost in such a description. The achievement of the goal through economies of Nature and similarities of nature is a testimony to the ultimate harmony of Nature. Natures, structures, elements, and elemental qualities—these characteristics of the microcosm, especially that part concerned with vision—show the fundamental interdependence of physiology and cosmology in Ḥunayn's version of Galenic visual theory.

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26. This point I explain and elaborate extensively in a monograph (forthcoming) on Ḥunayn's use, adaption, and modification of Galenic visual theory. If one discards the bias of looking for an efficient cause and is satisfied with final cause, the view of Ḥunayn becomes fully apparent.

Analytical Psychology: Carl Jung and His Circle*

FRED B. ROGERS

DR. Carl G. Jung (1875-1961) and his professional circle have contributed to our understanding of mental processes. The most aesthetic of the early depth psychologists, Jung's voluminous writings and transcendent viewpoint continue to stimulate thought. This influence today is far greater, however, in the creative arts than in psychiatry. His system, which is called analytical psychology, emphasizes the mystical and religious aspects of human behavior and shies away from the mechanical approach. Cultural and varied in focus, it reflects the words of its founder who said, "I do not want anyone to be a Jungian. I want people above all to be themselves....Each of us can carry the torch of knowledge but a part of the way, until another takes it from him."

Carl G. Jung (Photograph by Rapho Guillumette).

*Read at Temple University School of Dentistry, November 26, 1979.

Through the years Jung's colleagues included several Americans who worked in Switzerland and in turn hosted him on his visits to the United States. As a young physician in 1904, Jung organized a laboratory for experimental psychopathology at Burghölzli Hospital in Zurich, assisted by Franz Riklin and Ludwig Binswanger. Among his other associates were two American physicians: Frederick W. Peterson (1859-1938) of New York, and Charles Ricksher (1879-1943) of Massachusetts. Each of them wrote a paper with Jung on his psychophysical investigations with the galvanometer and pneumograph in normal and insane individuals (1907). This research, which detected physical evidences of emotional tension, was basic to the development of the lie detector. Jung also directed studies of other psychic reactions, including word-association tests; the American workers helped spread his reputation abroad.

Intensive scrutiny of patients with psychoses by Jung and his associates under the chiefship of Dr. Eugen Bleuler at Burgholzli led to the formulation of concepts for understanding these disorders. The distortion in schizophrenia they postulated was the unconscious mind breaking through into wakefulness and overwhelming conscious thought. Chaos of time, place, and person resulted, manifested by delusions, hallucinations, and 'word salad.' Dr. Silvano Arieti, an authority on schizophrenia, recently said, "Carl Jung applied to the symptoms of schizophrenia the same technique that Freud applied to dreams and became the first psychiatrist to give a full psychological interpretation to schizophrenic delusions. He wrote, 'Let the dreamer walk about and act as though he were awake, and we have at once the clinical picture of schizophrenia'."

Divergence from Freud's psychoanalytic doctrine on Jung's part was heightened with the publication of his treatise, *Wandlungen und Symbole der Libido,* in 1912. This study of imaginal dynamics was translated into English and published in New York as *Psychology of the Unconscious* (1916). Its translator, who provided an introduction to the volume, was Dr. Beatrice M. Hinkle (1874-1953), a pioneer psychoanalyst in this country. She later issued an expanded edition of Jung's signal book in 1927.

Jung's major work, *Psychological Types,* appeared in an English translation in 1923. This rendering was done by H. Godwin Baynes, a British psychiatrist who was Jung's partner in practice for several years. Dr. Baynes's wife, Cary F. Baynes (1883-1977), a 1911 graduate of the Johns Hopkins Medical School, was also a close associate of Jung who translated books on analytical psychology and Chinese philosophy.

In his *Psychological Types* Jung expanded the 'tough-minded' and 'tender-minded' temperaments proposed by William James. Dr. James, "the father of American psychology," whose company Jung had enjoyed on his first visit to the U.S.A. in 1909, had then heralded psychoanalysis as a bellwether of the future. The main points in Jung's personality typology were his classification of humans into introverted and extroverted types on the basis of mental attitude; further

distinctions rested upon the idea that in each person one or more primary functions of the mind (i.e., thinking, feeling, sensation, intuition) predominate. Introverts are withdrawn, cautious, and restrained in words and action, and these tendencies are increased during stressful encounters. Extroverts are the opposite — outgoing, impulsive, sociable people who seek the company of others, especially in times of stress. The contrast between introvert and extrovert has been amply confirmed by research, but instead of clear-cut 'types,' most present-day psychologists prefer to talk of 'tendencies,' varying in degree. An extension of Jung's theory is role behavior, a form of social learning in which a person adopts a *persona* that conforms to other people's expectations of him. This mask reflects both male (*animus*) and female (*anima*) aspects of the psyche met in each individual.

Jung's concept of personality was subsequently amplified by two eminent psychologists: Raymond B. Cattell in America and Hans J. Eysenck in England; both developed scales to measure the dimension of introversion-extroversion. Eysenck's measures, for example, uncover individual differences in terms of how much we need others as a source of reward or even to shape our behavior. In his book, *The Seasons of a Man's Life* (1978), Professor Daniel J. Levinson of Yale University's Psychiatry Department designated Jung "the father of the modern study of adult development."

Two Americans, Isabel B. Myers and Katharine C. Briggs, devised a psychological type indicator based upon Jungian principles in 1943. Modified since then by the Educational Testing Service of Princeton, New Jersey, it now consists of 166 multiple-choice questions applicable for grades 9-16 and adults, and taken in 50-55 minutes' time. Completed test forms are scored by means of a manual. This inventory aims to show which sides of one's personality have developed the most up to the age tested. Most people are in an ambivert category, having characteristics of both extrovert and introvert in their configurations.

Another talented disciple from America who studied with Jung was Henry A. Murray, a New York physician who left surgery for psychiatry. He later headed the Harvard University Psychological Clinic. Dr. Murray, though schooled in psychoanalysis, came to feel that Freud's biological instincts were too narrow in scope. Unlike Freud, Murray emphasized the importance of the environment as a determinant of personality. A web of social factors, he found, influences the personality in particular ways. Murray also stressed the physiological processes which underlie behavior, a reflection perhaps of his medical training. Murray's 'personology,' a lifelong series of motivational and perceptual changes, provides a dynamic concept of personality development.

Jung was fascinated by the influence on the individual of what he called the 'collective unconscious.' He assumed that each person's mind includes both a personal factor (the individual unconscious) and a disposition inherited from ancestors (the collective unconscious). The wisdom of the ages, he claimed, like

physical energy, is never destroyed. Rather it is conserved by passage through human minds and stored in a worldwide reservoir. Dr. M. Esther Harding (1889-1971), a New York psychiatrist and pupil of Jung, dilated upon this topic in her book, *Psychic Energy: Its Source and Its Transformation* (1947/1963).

Carl Jung encouraged exploration of the effects of parapsychological phenomena on the life of the mind. He and his co-workers made extensive studies of images, symbols, ritual, legend, Eastern philosophy, comparative religion, magic, and mythology. The subjective, intuitive, and metaphysical dimensions of human thought intrigued them. Feeling-toned complexes met in the individual unconscious and primordial images or 'archetypes' of the collective unconscious were described.

Man's spiritual nature, stated Jung, helped give a 'sense of meaning' to life. In the first half of life, meaning is concerned with the establishment of self, fulfillment of biological needs, and achievement of a place in society. In the second half, the sphere of meaning shifts to a goal of inner understanding. The later years are more numinous. In old age Jung said, "I have had the experience of being gripped by something that is stronger than myself, something that people call God."

Jung's medical practice reflected this spiritual orientation. He wrote: "The psychiatrist is a doctor of the soul... The doctor appears more in the role of the father... sometimes the doctor has a maternal significance... all these fantasy projections are founded on personal memories... The great healing factor in psychotherapy is the doctor's personality... Today, over the whole field of medicine, it is recognized that the task of the doctor consists in treating the sick person, not an abstract illness." Envisioning the psyche as a self-regulating system, Jung claimed that it exerted a gyroscopic effect to maintain mental balance, especially through dreaming. "The growth of the mind," noted Jung, "is the widening of the range of consciousness."

Followers of the many-sided Jung and his circle continue to amplify and extend their work in Switzerland and other countries. In the United States, centers bearing Jung's name are located in New York City, Houston, Los Angeles, and San Francisco. Teachers and students there and elsewhere aim to enhance our understanding of individual and group living. Analytical psychology now contributes to its broader counterpart humanistic psychology.

Near the end of his long life Dr. Jung was interviewed by John Freeman for BBC television's "Face to Face" series. This interview, conducted at his home in 1959, was a summing up of the sage's life and work. (The film is available today from the C. G. Jung Foundation, 28 East 39th Street, New York, N.Y. 10016.) Following Jung's death, Mr. Freeman wrote as follows: "Carl Gustav Jung was one of the great doctors of all time and one of the great thinkers of this century. His object always was to help men and women to know themselves, so that by

self-knowledge and thoughtful self-use they could lead full, rich, and happy lives... His own life... was as full, rich, and happy as any I have ever encountered."

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Annotated Bibliography of Paleopathology: 1970-1979
Part IV, T-Z
and Index

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T

527. **Taitz, L. S.** 1973. Tutankhamun's breasts. *Lancet* No. 7795, p. 149.

See Gray, 1973.

528. **Tapp, E., Curry, A. and Anfield, C.** 1975. Sand pneumoconiosis in an Egyptian mummy. *Br. Med. J.* 2:276.

Sections of a lung preserved in a canopic jar from a 12th Dynasty male showed pulmonary fibrosis and the presence of birefringent particles of silica, as diagnosed by electron microscopy using a silica detector. The silica is thought to have been inhaled during sand storms.

529. **Tarli, S. M. B., Paoli, G. and Parenti, R.** 1979. Blood-group determination in ancient Peruvian material. *J. Hum. Evol.* 8:589-95.

After washing cancellous bone with phenol and ethanol, an EDTA extract was filtered on a Sephadex column and tested with anti-A, anti-B and anti-H. Of 33 ancient Peruvian skeletons, 28 were of group O and five gave no reaction. It is suggested that false positive A or B antigen identification may occur in techniques which do not first remove potentially interfering substances. This would account for conflicting results previously reported.

530. **Taylor, E. L.** 1955. Parasitic helminths in medieval remains. *Veter. Rec.* 67:216-8.

Many ova of *Trichuris trichiura* and *Ascaris lumbricoides* were found in fecal material obtained from a large pit in Winchester, England, dated to about 1100 AD. The ova may have been of porcine origin although the proportions were the reverse of that normally found in pigs. The ova were well preserved. No strongyle eggs were found. The anomalous occurrence of *Dicrocoelium dendriticum* ova is discussed.

531. **Thomas, D. H., South, S. and Larsen, C. S.** 1977. Rich man, poor men: observations on three antebellum burials from the Georgia coast. *Anthrop. Papers of Am. Mus. Natl. Hist.* 54:393-420.

The skeletons of two slaves who died ca. 1800, and the son of a plantation owner who died in 1859, were excavated by crews from the American Museum of Natural History. There is an excellent discussion of the contrast in burial styles. The diagnosis may be in error to some extent; the case diagnosed as arthritis is almost certainly one of old trauma. Other diagnoses appear to be correct.

532. **Titlbachova, S. and Titlbach, Z.** 1977. Hair of Egyptian mummies. *Z. aegypt. Spr. u. Alt.* 104:79-85.

Fourteen samples of hair from mummies were analyzed micro- and macroscopically. Mummification was found to produce color distortion, three of the fourteen showed Negroid admixture.

533. **Tkocz, I., Bytzer, P. and Bierring, F.** 1979. Preserved brains in medieval skulls. *Am. J. Phys. Anthrop.* 51:197-202.

Fifty-six of seventy-four skulls excavated from a medieval churchyard on the island of Funen, Denmark were found to contain intracranial masses. Histologic and scanning electron microscopic studies revealed these to be well-preserved brain. Biochemical studies led to the conclusion that the brains were preserved by the formation of adipocere. No pathological changes were identified.

534. **Tobias, P. V.** 1959. A re-examination of the Kanam mandible. Leopoldville, Belgian Congo: Proc. Fourth Pan-African Congress on Prehistory.

See Tobias, 1960.

535. **Tobias, P. V.** 1960. The Kanam jaw. *Nature* 185:946-7.

A fragmented jaw known as the Kanam mandible is considered to be Neanderthal rather than *Homo sapiens*. Paleoanthropological factors are discussed, as is a lesion of the chin which had been diagnosed as an ossifying subperiosteal sarcoma. Tobias confirms the presence of a tumor and possibly a fracture of the jaw. These complicate the anatomical analysis. The jaw is in the British Museum (Natural History).

536. **Tobias, P. V.** 1974. Aspects of pathology and death among early hominids. *Leech* 44:119-24.

Three aspects of the pathology and death of australopithecines are discussed: dental lesions, injuries, and age-group mortality. The following dental lesions are covered: caries, crowding, abnormalities of shape, attrition, and enamel hypoplasia. A number of bones show fractures. It appears that the gracile australopithecines had a better chance of surviving to childbearing age than did the robust hominids.

537. **Trinkaus, E.** 1977. The Alto Salaverry child: a case of anemia from the Peruvian preceramic. *Am. J. Phys. Anthrop.* 46:25-8.

A ten- or eleven-year old child's skeleton from the Moche Valley of the northern Peruvian coast, dated ca. 2000-1700 BC, manifested prominent cribra orbitalia. The specimen extends the occurrence of anemia to Peruvian preceramic horizons. Dietary and parasitic factors are possible causes.

538. **Turner, C. G., II.** 1979. Dental anthropological indications of agriculture among the Jomon people of central Japan. *Am. J. Phys. Anthrop.* 51:619-36.

A high rate of caries in this population (ca. 1000 BC) indicates significant carbohydrate consumption, reflecting early agriculture on the isolated Japanese islands. These dates are placed in the context of the history of Japanese agriculture.

U

539. **Ubelaker, D. H.** 1979. Skeletal evidence for kneeling in prehistoric Ecuador. *Am. J. Phys. Anthrop.* 51:679-86.

Skeletal material dating to 1200-1550 AD showed flat facets of exostoses on the metatarsals and phalanges of many of the feet, especially in women. These changes are attributed to prolonged kneeling, either in resting or in work.

540. **Uhle, M.** 1975. La momia Peruana. *Indiana* (Berlin) 3:189-97.

Gerdt Kutscher has edited and published this manuscript written by Max Uhle, the "father of Peruvian archeology," originally prepared as a script to be read as an accompaniment to an illustrated lecture on Peruvian mortuary practices. Though the illustrative material is apparently now lost, the text, written about 1898, contains a useful account of the funerary materials that Uhle recovered at Pachacamac. There is a description of several thousand mummy bundles, which Uhle argued were intentionally fire-dried, although preservation was poor. The mummies were often eviscerated; the thoracic cavities showed signs of having been filled with foreign matter, and the brains had not been removed.

541. **Urteaga, O. and Moseley, J. E.** 1967. Craniometaphyseal dysplasia (Pyle's disease) in an ancient skeleton from the Mochica culture of Peru. *Am. J. Roentgen.* 99:712-6.

Part of a skeleton, lacking the skull, dated to 200-800 AD, showed an overabundance of normal cancellous bone within which no medullary cavity had formed. The X-ray and gross picture were classic for Pyle's disease, a disorder caused by failure of resorption of the secondary spongiosa.

542. **Urteaga, O. and Pack, G. T.** 1966. On the antiquity of melanoma. *Cancer* 19:607-11.

The history of malignant melanoma is reviewed, starting with its description by Hippocrates in the fifth century B.C. The lesion was found in nine pre-Columbian mummies. Of particular interest are the X-rays of a specimen that showed diffuse skeletal metastases. Rounded melanotic tumors are described in the skin, but there are no histologic sections.

V

543. **Van Cleave, H. J. and Ross, J. A.** 1947. A method for reclaiming dried zoological specimens. *Science* 105:318.

Details of procedures using trisodium phosphate to reconstitute dried animal material are given. This technique has been widely used in the recovery of helminth ova from coprolites.

544. **Vangerven, D. P. and Armelagos, G. J.** 1970. Cortical involution in prehistoric Mississippian femora. *J. Geront.* 25:20-2.

Elderly women showed a 30% reduction in cortical thickness compared to an 11% reduction in males. The difference was statistically significant. Reduced cortical thickness was age-associated in both sexes.

545. **Verner, M.** 1977. Suppl. to Brezinova and Hurda, 1976. *Z. aegypt. Spr. u. Alt.* 104:144.

A tabular survey of ancient Egyptian coffins in Czech collections.

546. **Verut, D. D.** 1973. *Pre-Columbian dermatology and cosmetology.* USA: Schering Corporation.

A well illustrated survey of Mexican sculpture includes several figures with saddle nose, frontal bossing and kyphosis, which the author interprets as evidence of syphilis (achondroplasia is an alternative). Other pathologic conditions are illustrated. Differential diagnosis is discussed.

547. **Voigt, E.** 1938. Ein fossiler Saitenwurm aus der eozanen Braunkohle Geiseltales. *Nova Acta Leopoldina* 5:351-60. (A fossil hairworm from the Eocene Geiseltales brown coal).

See Szidat, 1944.

548. **Vreeland, J.** 1977. Ancient Andean textiles: clothes for the dead. *Archaeol.* 30:167-78.

A study of mummy bundles at the National Museum in Lima includes a survey of the development of fabric technology in ancient Peru and its interrelation with mortuary ritual. Of interest is the description of how the combination of cultural data on fabrics and osteologic information can provide accurate assessments of age, sex, and status.

549. **Vreeland, J.** 1978. Prehistoric Andean mortuary practice: preliminary report from Peru. *Curr. Anthrop.* 19:212-3.

Twenty-four mummies from the 2nd century BC to 1470 AD showed no evidence of deliberate mummification. The bodies had been preserved by extreme atmospheric dryness combined with the use of long strips of cotton for wrapping.

550. **Vyhnanek, L. and Strouhal, E.** 1975. Arteriosclerosis in mummies. *Anthrop.* 13:219-21.

X-ray studies of 24 intact adult mummies in Czech collections revealed calcific arteriosclerosis in three. Since non-calcific disease cannot be diagnosed radiologically, the epidemiologic use of the technique is limited.

551. **Vyhnanek, L. and Strouhal, E.** 1976a. X-ray examination of ancient Egyptian mummies from Czechoslovak collections. *Acta. F.R. Natl. Univ. Comen., Anthrop.* 22:301-6.

Abstract unavailable.

552. **Vyhnanek, L. and Strouhal, E.** 1976b. Spondylosis and arthrosis in ancient Egyptian mummies from Czechoslovak collections. *Acta F.R. Natl. Univ. Comen., Anthrop.* 23:319-24.

A radiologic survey of 22 mummies revealed a significant incidence of cervical degenerative joint disease, but little arthritis of the extremities. There is a brief speculative discussion of etiology. The English version is difficult.

553. **Vyhnanek, L. and Strouhal, E.** 1976c. Radiography of Egyptian mummies. *Z. aegypt. Spr. u. Alt.* 103:118-28.

A well illustrated review of the radiologic examination of Egyptian mummies in Czech collections. Many pathologic conditions are diagnosed, including congenital defects, arthritis, fractures, arteriosclerosis, and dental disorders. The pseudopathology of intervertebral disc opacification is discussed.

W

554. **Wade, W. D.** 1967. *Miscellaneous papers in paleopathology: I. Technical series no. 7.* Flagstaff: Mus. No. Ariz.

A small collection of six diverse but excellent papers.

555. **Walker, E. G.** 1978. The paleopathology of certain skeletal remains from Saskatchewan. *Na'pao-Sask. Anthrop. J.* 8:30-47.

This well illustrated survey of paleopathologic findings in 65 individuals from archeologic sites scattered throughout the province demonstrates a wide variety of conditions, including dental, traumatic, degenerative, inflammatory and developmental lesions, and two small benign bone tumors. Most of the lesions in this nomadic bison-hunting population were induced by activity.

556. **Walshe, J. M.** 1973. Tutankhamun: Klinefelter's or Wilson's? *Lancet* no. 7794, pp. 109-10.

See Gray, 1973.

557. **Walter, N. P.** 1974. An x-ray life after death. *Terra* 12:3-7.

X-ray studies of a Ptolemaic mummy and a Peruvian child mummy include eight photographs of x-rays.

558. **Waterman, R.** 1960. Paleopathologische Beobachtungen an altägyptischen Skeletten und Mumien. *Homo* 11:167-79. (Paleopathologic studies on ancient Egyptian skeletons and mummies).

A review of the paleopathology of Egyptian skeletons and mummies.

559. **Wei, O.** 1973. Internal organs of a 2100 year old female corpse. *Lancet* no. 7839, p. 1198.

The findings in a body preserved from the Han dynasty are presented. Preservation was due to an anaerobic environment and to antimicrobial mercurides in fluid in the coffin. Death was attributed to coronary artery disease, perhaps an acute myocardial infarction precipitated by biliary colic. The subject suffered from whipworm, pinworm, schistosomiasis, a poorly healed fracture of the forearm, and old tuberculosis.

560. **Weisman, A. I.** 1967. Ancient surgery of the Americas. *Int. Surg.* 47:1-9.

A reconstruction of the surgical prehistory of the Americas is attempted, based on a study of ancient sculpture. Pre-Columbian doctors were grouped into four types: 1) the high priest healer; 2) the clinical pharmacologist; 3) the general practitioner, and 4) the surgical specialist. Surgical practices, including trephination, thoracotomy and cosmetic surgery, are discussed, the author contending that they were in the main ritualistic rather than therapeutic. No references are given.

561. **Weiss, D. and Møller-Christensen, V.** 1971. Leprosy, echinococcosis and amulets: a study of a medieval Danish inhumation. *Med. Hist.* 15:260-7.

Examination of 650 skeletons from a medieval Danish leprosarium revealed one skeleton (ca. 1450 A.D.) with calcified cystic structures in the abdominal cavity. It is concluded that these are probably echinococcal cysts derived from the rupture of a primary hepatic cyst.

562. **Weiss, D., Whitten, B. and Leddy, D.** 1972. Lead content of human hair (1871-1971). *Science* 178:69-70.

The lead content per unit weight of hair was found to be significantly higher in an earlier population (1871-1923), for both adults and children, than in present-day populations. These results indicate that the lead content of human hair has decreased markedly in the last 50 years despite the general increase in atmospheric lead.

563. **Weller, M.** 1972. Tutankhamun: an adrenal tumor? *Lancet* no. 7790, p. 1312.

See Gray, 1973.

564. **Weller, R. O. and Nester, B.** 1972. Histological reassessment of three kidneys originally described by Richard Bright in 1827-1836. *Brit. Med. J.* 24 June 1972, pp. 761-63.

Three of the kidneys examined by Bright were reexamined. They had initially been injected with red mercury salts and fixed in spirit, and were transferred to formalin during World War I. Histologic condition was good.

565. **Wells, C.** 1967a. A leper cemetery at South Acre, Norfolk. *Medieval Archeol.* 11:242-8.

Twelve fragmented skeletons were recovered during road widening operations in Norfolk, England. A leper house was known to be located nearby in 1340. Seven of the skeletons showed probable or possible signs of leprosy.

566. **Wells, C.** 1967b. Report on the human skeletons from Red Castle, Thetford. *Norfolk Arch.* 34:155-86.

Detailed measurements are given in 85 individuals who seemed to differ from Anglo-Saxons. Osteoarthritis was the commonest disease found, followed by abscesses around the roots of teeth. Mastoiditis and sacral osteitis were also found.

567. **Wells, C.** 1968a. Goitre in two African Sculptures. *Med. Hist.* 12:89-91.

Two statuettes from Africa, one Yoruba and the other Babwende, depict goiter.

568. **Wells, C.** 1968b. Dental pathology from a Norwich, Norfolk burial ground. *J. Hist. Med. All. Sci.* 13:372-9.

Numerous mandibles recovered from an 18th century burial site showed caries and abscesses. Dental erosion, possibly from smoking clay pipes, was noted.

569. **Wells, C.** 1968c. Osgood-Schlatter's disease in the ninth century? *Brit. Med. J.* 8 June 1968, pp. 623-4.

Description of a tibia of late Saxon date showing evidence of the disease.

570. **Wells, C.** 1971a. Un trait anatomique négligé chez les Anglo-Saxons. *Helinium* 11:1963-5.

A femur showing the effects of heavy agricultural work, especially digging, is described.

571. **Wells, C.** 1971b. Abnormality in mediaeval femur. *Brit. Med. J.* 27 February 1971, pp. 504-5.

Among sixteen skeletons turned up by a bulldozer, one femur showed highly typical results of a juvenile slipped femoral epiphysis.

572. **Wells, C.** 1973a. Sunrise dating of death and burial. *Norf. and Norw. Archaeol. Soc.* 35:435-42.

Ninety-seven burials of the Middle Saxon Period in Norfolk, England were apparently arranged with their feet toward the sunrise. By observing compass bearing of burials, it was possible to plot deaths by time of year, for age and sex. The sample is small but fits in with the idea that old people were apt to die chiefly in winter.

573. **Wells, C.** 1973b. Video recording of paleopathology. *Bull. N.Y. Acad. Med.* 49:786-92.

Six recordings, each running forty minutes, in black and white, provide an introductory course in paleopathology. Bones, dental disease, infections such as tuberculosis and leprosy, and traumatic lesions are covered.

574. **Wells, C.** 1973c. A paleopathological rarity in a skeleton of Roman date. *Med. Hist.* 17:399-400.

The skeleton of a middle-aged male showed clear gross and radiologic evidence of gout. The subject was relatively opulent, the burial being one of two sarcophagus inhumations in a cemetery which contained 266 burials in coffins or shrouds. The possible relation between gout and economic status is mentioned.

575. **Wells, C.** 1973d. The paleopathology of bone disease. *Practitioner* 210:384-91.

The discussion includes tuberculosis, leprosy, and treponemal infections.

576. **Wells, C.** 1974a. Osteochondritis dissecans in ancient British skeletal material. *Med. Hist.* 18:365-9.

This disease consists of an avascular necrosis in the subchondral bone at a joint, followed by degenerative changes in the overlying cartilage. Eventually the avascular area separates from the rest of the bone and becomes a loose body within the joint. The condition is most common in the knee, less common in the ankle, elbow and elsewhere. A series of photographs shows this condition in Romano-British and Anglo-Saxon joints. The disease was much more common among these groups than among the earlier Bronze Age peoples. The cause is unknown, but trauma is thought to play a large role.

577. **Wells, C.** 1974b. Probable trephination of five early Saxon skulls. *Antiquity* 48:298-302.

Photographs support the suggestion that these healed trephinations were the work of one skilled surgeon.

578. **Wells, C.** 1974c. The results of "bone-setting" in Anglo-Saxon times. *Med. Biol. Illus.* 24:215-20.

Fractures treated and healed with varying degrees of success are described. Most photographs are of long bones, but a fractured thoracic vertebra and fractured ribs are also shown.

579. **Wells, C.** 1975. Ancient obstetric hazards and female mortality. *Bull. N.Y. Acad. Med.* 51:1235-49.

In modern times women live longer than men. The shorter lives of women in the past have been attributed to the hazards of childbearing, but Wells argues that this may not necessarily be the case. The two biggest causes of death, obstruction from pelvic deformities, usually due to rickets, and infections, were probably much less common in rural societies than in the urban populations of the 18th and 19th centuries. The obstetrical hazards encountered by the Anglo-Saxons and other early peoples were probably much less than those encountered by later populations.

580. **Wells, C.** 1976a. Ancient lesions of the hip joint. *Med. Biol. Illus.* 26:171-7.

This article includes excellent photographs of various pathologic hips from Roman and medieval England. Lesions include congenital dislocation, slipped femoral head epiphysis, exostoses, fracture, osteochondritis dissecans, and osteoma.

581. **Wells, C.** 1976b. Excavations at Whey Curd Farm, Wighton. VI. notes on the inhumations and the cremation. *E. Angl. Archaeol. Rep.,* No. 2, pp. 84-98. Norfolk, England: Norfolk Archaeol. Unit.

This group of burials consisted of three men and two women with a mean age at death of 52 years, an unusually high figure. The dating is uncertain and may range from the Iron Age to the later Anglo-Saxon period. Each individual had osteoarthritis and dental attrition. Many fractures were seen.

582. **Wells, C.** 1976c. The Anglo-Saxon cemetery at the Paddocks, Swaffham. VIII. the skeletal material. *E. Angl. Archaeol. Rep.,* No. 2., pp. 33-41. Norfolk, England: Norfolk Archaeol. Unit.

Nineteen inhumations and one possible cremation were studied. Two of the skulls showed successful trephinations, some of the first examples of this procedure in pagan Anglo-Saxon skulls.

583. **Wells, C.** 1976d. Fractures of the heel bones in early and prehistoric times. *Practitioner* 217:294-8.

A few examples are presented. Wells points out that fractures are reflections of behavior. In early man these lesions are due to falls from heights. In the present era motor vehicle accidents are a common cause. It is assumed that early man was at lower risk, as only a few occupations were likely to result in falls.

584. **Wells, C.** 1976e. The excavation of a tumulus at Barrow Bottom, Risby, Suffolk. *E. Angl. Archaeol.* 3:57-60.

The Risby barrows display a range of funerary practices, including primary crouched burials, urned cremations of the Bronze Age, prehistoric secondary crouched burials,and extended Anglo-Saxon burials. A primary burial was that of an arthritic woman. One of the secondary burials was that of a 25-35 year old male killed by a cranial blow from a sword or ax.

585. **Wells, C.** 1976f. An urned cremation from a Late Bronze Age cemetery at Shouldham, Norfolk. *Archaeol. J.* 133:38-42.

The urns from this cemetery were found to contain the remains of several cremations, placed sequentially in the urns. The suggestion is made that the urn was kept in the house and the ashes placed in, one on top of the other. The importance of studying layer by layer is emphasized.

586. **Wells, C.** 1976g. The Romano-British site at Icklingham; the human burials. *E. Angl. Archaeol. Rep.,* No. 3, pp. 103-20.

Forty-seven burials from a Romano-British cemetery were studied, those sexed being 19 males and 14 females. Osteoarthritis, the commonest identifiable disease, was found in 8 males and 3 females. One elderly woman had a "poker spine." There were 5 cases of fractures and one of osteochondritis. Three burials showed a peculiar annular osteoarthritis of radius and ulna and of tibia and fibula. It is suggested that all three had been shackled, while alive and had subsequently developed ulceration and periostitis.

587. **Wells, C.** 1977a. Une curieuse blessure dans un squelette du deuxième siècle A.D.: cimetière Roman-Britannique de Circencester, Comté de Gloucestershire (G.B.). *Trav. Docum. Centre Paléoanthrop. Paléopathol.* 4:9-19.

The skeleton of a 50 year old man, dated to A.D. 120, is described. He had been decapitated through the C2/C3 vertebrae, and the posterior border of the mandibular rami had been injured. The skull had been trephined through the right frontal region, perhaps therapeutically, after a severe sword cut, which had left a depressed fracture of the right parietal bone.

588. **Wells, C.** 1977b. Disease of the maxillary sinus in antiquity. *Med. Biol. Illus.* 27:173-8.

The pathology of the maxillary sinuses is reviewed. Wells invented a technique for examining the interior of the sinus with minimal damage to the specimen. A 6mm. hole is drilled and the interior is viewed with an arthroscope. The frequency of sinusitis in ancient populations was estimated by this technique. The highest level was 6.8% of 204 Anglo-Saxon skulls, as compared with 2.8% and 3.6% for Romano-British and medieval skulls, respectively. Earlier skulls showed no evidence of sinusitis. A possible relation to smoke pollution is discussed.

589. **Wells, C.** 1978a. Paleopathology — modern medical evidence from ancient human remains. *Med. Leg. J.* 46:35-46.

The problems of identification and diagnosis of paleopathologic bone specimens are discussed, including pseudopathology. The paper deals primarily with those cases which, in the modern world, would be assigned to forensic pathology, and range from Saxon sword wounds, poisoning with heavy metals, child neglect, fire-related deaths, penal injuries and mutilations, suicide and to what may be one of the first cases of industrial death.

590. **Wells, C.** 1978b. A mediaeval burial of a pregnant woman. *Practitioner* 221:442-4.

A ca. twelfth century skeleton of a 22-year-old woman with fetal bones in her abdomen is reported from London. The fetal bones are almost complete and in very good condition. The woman was small with a deformed pelvis, while the fetus was large. Death was probably due to maternal exhaustion.

591. **Wells, C.** 1978c. Disease and evolution. *Biol. Hum. Affairs* 43:1-13.

One of Calvin Wells' last papers summarizes his thoughts on a lifetime in the pursuit of paleopathology. The short and philosophical paper is well worth reading.

591a. **Wells, C.** 1979. Dwarfism and cervical rib in an Anglo-Saxon from Jarrow monastery. *Trans. Stud. Coll. Physicians Phila.* 5th ser. 1:62-6.

The remains of this young woman featured maxillary sinusitis, vertebral lesions, dwarfism, and cervical rib.

592. **Wells, C. and Dallas, C.** 1976. Hydatid cyst; Romano-British pathology. *Antiquity* 50:53-5.

An object resembling in appearance the egg of a chicken was recovered from the thoracic cavity of a 45-year-old woman in Cambridgeshire, England, dated to the late first or early second century A.D. The diagnosis of echinococcal cyst was made. The disease was known to ancient writers such as Hippocrates, Galen, and Pliny. This is the earliest reported record of the actual parasitic cyst.

593. **Wells, C. and Laurence, P.** 1976. A pathological dolphin. *Med. Biol. Illus.* 26:35-7.

The skeleton of a dolphin shows marked spinal deformities, including lateral curvature, changes in vertebral bodies, and osteophytosis. The possibility of injury is discussed.

594. **Wells, C. and Laurence, P.** 1977. A pathological cannon bone of a giant deer cf. *Praemegaceros verticornis* (Dawkins). *Ossa* 3/4:3-9.

A bone from a giant deer of the early middle Pleistocene in Norfolk, England, is described. The gross and radiologic diagnosis is ossified subperiosteal hematoma.

594a. **Wells, C. and Waldron, T.** 1979. Exposure to lead in ancient populations. *Trans. Stud. Coll. Physicians Phila.* 5th ser. 1:102-15.

The lead content of skeletons from fifteen British sites (1600 BC to medieval period) was analyzed through atomic absorption spectrophotometry. High levels caused by metallurgical, cosmetic, and dietary practices are distinguished from post-mortem contamination. Possible explanations are advanced for the highest lead values from Roman Cirencester and Anglo-Saxon Jarrow.

595. **Wells, C. and Woodhouse, N.** 1975. Paget's disease in an Anglo-Saxon. *Med. Hist.* 19:396-400.

The skeleton of a 65-year-old man dating to about 950 A.D. showed marked thickening and distortion of virtually all bones. The gross and radiologic picture is clearly that of Paget's disease, complicated by femoral fracture. Differential diagnosis is discussed.

596. **Wesolowsky, A. B.** 1975. Pathology of human remains from Stobi, 1970-1973. In *Studies in the antiquity of Stobi,* eds. D. Mano-Zissi and J. Wiseman, Vol. II. Beograd.

A general survey of the pathology noted in skeletons excavated from Stobi, Yugoslavian Macedonia. The material dates from the 2nd century B.C. through the 4th century A.D. Lesions include leg fractures, neural arch anomalies, arthritis, possible thalassemia and osteitis, caries, alveolar abscesses, and enamel hypoplasia.

597. **White, T. D.** 1978. Early hominid enamel hypoplasia. *Am. J. Phys. Anthrop.* 49:79-84.

This survey of enamel hypoplasia in two South African australopithecines makes the seemingly obvious but often neglected point that fossils are the remnants of dead individuals and are not necessarily representative of the living population. Within this perspective, it is suggested that age-related differences in the incidence of hypoplasia are related to predator preference and to parental or social differences in the care of smaller individuals.

598. **White, W.** 1969. An Assyrian physician's *Vade mecum. Clio Med.* 4:159-71.

A translation of a tablet in the collection of the Oriental Institute of the University of Chicago makes it clear that Assyrian medicine was based on concepts very different from those of today. There is a good list of references.

599. **Wilcox, U. V. II and Wilcox, U. V. III** 1972. Ancient disease in the southwest. *Indian Notes* 8:9-10.

Radiologic examination of eight American Indian southwest mummies revealed dental disease, arthritic and congenital deformities, fractures and malnutrition.

600. **Wilke, P. J. and Hall, H. J.** 1975 *Analysis of ancient feces: a discussion and annotated bibliography.* Berkeley, Calif. Archeol. Res. Fac.

One hundred thirty-four entries cover most of the published material on coprolites. A brief but informative introduction includes the history and development of research, studies of paleoecology and ancient feces, parasitism, and problems of method and interpretation.

601. **Wilkinson, R. G.** 1975a. Trephination by drilling in ancient Mexico. *Bull. N.Y. Acad. Med.* 15:838-50.

A drilled trephination is presented, dated ca. 650 A.D. There is an excellent review of the literature and a discussion of the possible reasons for the precedure in this individual, in whose skull there are four openings, two of which were clearly drilled.

602. **Wilkinson, R. G.** 1975b. Techniques of ancient skull surgery. *Nat. Hist.* 84:94-101.

While the main center of prehistoric cranial surgery in the New World was Peru, the author reports another center at the site of Monte Alban, in the valley of Oaxaca, Mexico. The practice here was apparently restricted to 400-700 A.D. Techniques included cutting, scraping and drilling. The last, using a hollow drill to remove a circular piece of the vault, was unique to Mexico and may have developed from the manufacture of jewelry and from the practice of dental mutilation.

603. **Witenburg, G.** 1961. Human parasites in archaeological findings. *Bull. Israel Explor. Soc.* 25:86.

Coprolites recovered from a cave in Israel near the Dead Sea were dated to about 160 A.D. Rehydration revealed protozoan cysts and ova of *Trichuris trichiura,* confirming the existence of this nematode in the Mediterranean area before the discovery of America.

604. **Wood, C. S.** 1979. *Human sickness and health: a biocultural view.* Palo Alto, Calif.: Mayfield.

This general text in medical anthropology begins with a thorough but less than scholarly review of human and fossil skeletal paleopathology. The bibliography is somewhat outdated and recent studies, particularly of mummies, are not covered. The remainder of the book contains many inaccuracies.

605. **Wright, J. V. and Anderson, J. E.** 1963. *The Donaldson Site.* Ottawa: Nat. Mus. Canad.

Fourteen individuals excavated from a Middle Woodland site in Ontario were examined. Arthritis and dental abscesses are described.

606. **Wyckoff, F. W. G.** 1963. Collagen in fossil bone. *Proc. U.S. Nat. Acad. Sci.* 50:215.

Bone of early Pleistocene date was analyzed for protein content. The electron microscope was used to study the extent of collagen preservation. The collagen showed a periodicity of about 600 Å.

Y

607. **Yeatman, G. W.** 1971. Preservation of chondrocyte ultrastructure in an Aleutian mummy. *Bull. N.Y. Acad. Med.* 47:104-8.

Electron microscopy of cartilage from an Aleut mummy showed apparent preservation of nucleoli and possible granular and endoplasmic reticulum. It appears that the rigidity of the cartilaginous matrix protected the cells.

Z

608. **Zaino, D.E. and Zaino, E. C.** 1975. Cribra orbitalia in the aborigines of Hawaii and Australia. *Am. J. Phys. Anthrop.* 42:91-94.

Cribra orbitalia was noted in 22.8% of 53 crania of Hawaiian aboriginal infants and children and 22.6% of immature Australian crania. Osteoporotic pitting was also present in the Australians. It is suggested that iron deficiency and malnutrition are insufficient as causes of the lesions. A relationship to some blood disorder such as sickle cell anemia or thalassemia is implied.

609. **Zaino, E. C.** 1967. *Symmetrical osteoporosis, a sign of severe anemia in the prehistoric Pueblo Indians of the southwest.* In Wade, 1967, pp. 40-47.

A 25% incidence of porotic hyperostosis was found in this study of 84 skulls of infants and young children from Basketmaker to Pueblo III times. Because the incidence seemed to remain stable through time, despite increasingly improved nutrition, the author feels that this lesion is a sign of a severe congenital hemolytic anemia rather than malnutrition.

610. **Zaki, A. and Iskander, Z.** 1943. Materials and method used for mummifying the body of Amentefnekht, Saqqara, 1941. *Ann. du Serv. des Antiq. de l'Égypte.* 42:223-55.

This chemical analysis of mummy materials, performed in 1942, is of historical interest. The mummy was prepared in some haste, in part in the sarcophagus, furnishing another example of the variability of the Egyptian mummification process.

611. **Zimmerman, M. R.** 1972. Histological examination of experimentally mummified tissues. *Am. J. Phys. Anthrop.* 37:271-80.

Various degrees of preservation were seen in different organs experimentally mummified and rehydrated. The use of special stains and the possibility of large scale mummy investigations are discussed.

612. **Zimmerman, M. R.** 1973. Blood cells preserved in a mummy 2000 years old. *Science* 180:303-4.

Well preserved red blood cells mixed with autolyzed white cells were seen within the blood-vessels of a mummified American Indian from Kentucky, refuting suggestions that such structures in earlier reports were fungi.

613. **Zimmerman, M. R.** 1974. New approaches to the study of ancient disease. *Expedition* 17(1):24-30.

A general review of the paleopathology of mummies dissected by the Paleopathology Association and by the author in Egypt and Alaska. Good photographs are included.

614. **Zimmerman, M. R.** 1976a. A paleopathologic and archeologic investigation of the human remains of the Dra Abu el-Naga site, Egypt, based on an experimental study of mummification. Ph.D. thesis, Univ. of Pennsylvania.

The remains of 30 individuals fragmented into 7000 pieces by tomb robbers are examined. Mummification experiments has shown differential preservation of various lesions, inflammatory conditions being least preserved, degenerative ones with included foreign materials being in better condition, and neoplasms being extremely well preserved. In the 30 mummies from Drabu Naga, conditions identified included tuberculosis, anthracosis, spina bifida, a healed fracture, Paget's disease of bone, and one benign skin tumor. The absence of malignancy in mummies is seen as a reflection of the rarity of cancer in antiquity. It is suggested that proliferation of cancer is a phenomenon of the last two centuries.

615. **Zimmerman, M. R.** 1976b. Rehydration of accidentally desiccated pathology specimens. *Lab. Med.* 7:13-17.

Accidental desiccation of tissues occurs occasionally in pathology laboratories. The application of a simple technique used in paleopathologic studies, rehydration in Ruffer's solution, restores the tissues to a state in which processing can be contined successfully.

616. **Zimmerman, M. R.** 1977a. An experimental study of mummification pertinent to the antiquity of cancer. *Cancer* 40:1358-62.

A variety of tumors obtained at autopsy was mummified experimentally. With normal tissue as a control, neoplastic lesions survived rehydration with equal or superior histologic preservation. Therefore, the low incidence of malignancy reported by paleopathologists cannot be explained on the basis of artifactual loss of cancer cells.

617. **Zimmerman, M. R.** 1977b. The mummies of the tomb of Nebwenenef: paleopathology and archeology. *JARCE* 14:33-6.

The tombs of Dra Abu el-Naga have been plundered and robbed many times. The mummies found there were in more than 7000 pieces, derived from 30 individuals placed in one tomb over many centuries. The most interesting find was the torso of a child whose internal organs were intact. The lungs were adherent to the chest wall. Other findings were: scoliosis, blood in the trachea and lungs, acid-fast bacilli in the vertebrae, and iron pigment in the lungs. The diagnosis was pulmonary and osseous tuberculosis, with death due to a

severe pulmonary hemorrhage. Other specimens showed atherosclerosis, anthracosis, and spina bifida. These diagnoses are correlated with archeologic information on the ancient Egyptian life style.

618. **Zimmerman, M. R.** 1978. The mummified heart: a problem in medicolegal diagnosis. *J. For. Sci.* 23:750-3.

Bodies discovered in a naturally mummified state are occasionally presented to forensic practitioners for determination of cause of death. An experimental study of mummification is presented that suggests that while the diagnosis of acute myocardial infarct is probably not possible under these conditions, strong presumptive evidence such as coronary artery disease or thrombosis, myocardial scarring, and chronic visceral congestion is well preserved. Such findings would allow the assignment of arteriosclerotic heart disease as a cause of death in mummified cadavers.

619. **Zimmerman, M. R.** 1978a. Have we invented cancer? In *In the spirit of enterprise: from the Rolex awards,* ed. G. B. Stone, pp. 153-8. San Francisco: Freeman.

In this proposal for a return expedition to Egypt, the question of the apparently recent development or increase in incidence of cancer is addressed.

620. **Zimmerman, M. R.** 1978b. An experimental base for paleopathologic diagnosis. *Trans. Stud. Coll. Phys. Phila.* 4th ser. 45:299-302.

Experimental mummification and rehydration of known lesions revealed differential preservation of various kinds. While microorganisms and parasites are well preserved, necrosis and inflammation are not. Tumors are well preserved, and it is suggested that the absence of tumors in mummified ancient remains represents a true scarcity.

621. **Zimmerman, M. R.** 1979. Pulmonary and osseous tuberculosis in an Egyptian mummy. *Bull. N.Y. Acad. Med.* 55:604-8.

Direct evidence for the existence of tuberculosis in ancient Egypt is provided. Tissue samples from a child's mummy revealed acid-fast bacilli in the vertebral bodies and blood in the lungs. While identification of the species of tubercle bacillus in this case was not possible, the author suggests that ancient Egypt was the site of evolution of the human disease from *Mycobacterium bovis.*

622. **Zimmerman, M. R.** 1980. *Foundations of medical anthropology.* Philadelphia:Saunders.

An introduction to the basic principles of anatomy, physiology, biochemistry and pathology, in a cultural context. A time perspective is provided by the use of paleopathologic evidence of disease.

623. **Zimmerman, M. R. and Clark, W. H., Jr.** 1976. A possible case of subcorneal pustular dermatosis in an Egyptian mummy. *Arch. Dermatol.* 112:204-5.

Examination of the mummy of an Egyptian who died in 892 B.C. ± 53 years showed the skin to be well preserved, with inguinal subcorneal vesicles of the type seen in subcorneal pustular dermatosis. This condition apparently antedates by almost three millenia its description as a clinicopathological entity by Sneddon and Wilkinson in 1956.

624. **Zimmerman, M. R. and Smith, G. S.** 1975. A probable case of accidental inhumation of 1600 years ago. *Bull. N.Y. Acad. Med.* 51:828-37.

The autopsy of a frozen Eskimo, found on St. Lawrence Island in the Bering Strait, is reported. The body was found lying on a beach by Eskimo hunters. Radiocarbon dating placed the body at ca. 400 A.D. The skin had been tattooed, and the body was naked, which would occur only inside a house, as Eskimos are buried clothed. As aspirated moss was found within the bronchi, the probable cause of death was accidental inhumation and suffocation, perhaps in a landslide. The autopsy revealed coronary atherosclerosis, scoliosis, anthracosis and emphysema, probable healed histoplasmosis, and an ovum of the fish trematode *Cryptocotyl lingua.*

625. **Zimmerman, M. R. and Tedford, R. H.** 1976. Histologic structures preserved for 21,300 years. *Science* 194:183-4.

The authors have demonstrated again the value of examining tissue from specimens that might seem unrewarding. The study included sections from a mammoth, a lynx, a rabbit, and other animals found frozen in Alaska. The carbon dating of the mammoth indicated an age of 21,300 years, and the other animals were assumed on stratigraphic evidence to have lived from 15,000 to 25,000 years ago. The frozen tissues were well preserved grossly and microscopically. Fine histologic detail such as cross-striations in skeletal muscle were identified in some sections. While no pathologic changes were identified, the demonstration of residual histologic structure in these very ancient tissues indicates that discovery of evidence of disease in similar specimens is possible and feasible.

626. **Zimmerman, M. R., Yeatman, G. W., Sprinz, H. et al.** 1971. Examination of an Aleutian mummy. *Bull. N.Y. Acad. Med.* 47:80-103.

Examination of a 300-year-old mummy revealed gram-negative bacillary pneumonia with septicemia to be the cause of death. Other findings included pulmonary anthracosis, mild atherosclerosis, severe periodontal disease, and dental attrition.

627. **Zingeser, M. R.** 1979. The "Pithecanthropus IV" diastemata: malocclusion in a fossil man. *J. Hum. Evol.* 8:523-5.

An increased interdental space between the canine and lateral incisors is a characteristic of simians. Its presence in the maxilla of Pithecanthropus IV (Java 1939) has been used to suggest that this skull is simian and not that of *Homo erectus.* With casts and analysis of teeth of living patients the author demonstrates these spaces can be created by malocclusion (severe overbite). Consequently, the presence of such an interdental space is not necessarily inconsistent with classification of the skull in question as *Homo erectus.*

628. **Ziv, M., Arensburg, B. and Nathan, G. L.** 1973. Ossification in the jugular foramen of ancient skull. *Arch. Otol.* 97:406-9.

An unusual ossified unilateral mass at the jugular foramen and bulb was found in a 2000-year-old skull from the vicinity of Jerusalem. On the opposite side of the obstruction, enlarged and widened transverse and sigmoid sulci were observed. The case of the morphologic finds and their possible clinical implications are discussed.

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ESSAY - REVIEW

ELISABETH BERG-SCHORN. *Henry E. Sigerist (1891-1957). Medizinhistoriker in Leipzig und Baltimore: Standpunkt und Wirkung.* Arbeiten der Forschungsstelle des Instituts für Geschichte der Medizin der Universität zu Köln, Band 9. Köln: Hansen, 1978. 337 p.

Reviewed by MAX LANDSBERGER

The Story of the History of Medicine

CONFRONTATIONS of men with disease have happened at all times and in all cultures, and in a variety of ways. Yet the history of medicine as a scientific discipline, the systematic recording and relating of medical data, was not organized before the turn of the last century. In the recently published book on Henry Sigerist, the author discusses the central position of this medical historian who probably had the greatest influence on the young movement in Europe and North America. Almost all our contemporary representatives of this field in the Western world have their scientific roots in the work of that man and around him. His productive life began and gained world-wide recognition in Leipzig, reached its climax in Baltimore, and ended with a still very rewarding phase, relieved from official duties, in Switzerland.

The nineteenth century had ended with no academic institute in existence where research on medical history could be organized and concentrated. Until that time the only teaching offered at the university level had consisted of including important historical developments as a sideline to clinical instruction. The first attempt to make the history of medicine a special field of study and teaching must be credited to three men: Max Neuburger (1868-1955), who started a medical historical archive in Vienna, in 1907, Julius Pagel (1851-1912), a student of old medical literature in Berlin, and the apparently domineering personality of Karl Sudhoff (1853-1938) in Leipzig. The very first full professorship of the history of medicine was given to Max Neuburger in 1917; the first chairmanship of such a department at the Leipzig University, with professorial rank, went to Karl Sudhoff in 1919. A few other universities started some part-time teaching of this subject at about that time. The University of Graz, Austria, deserves mention as the first place in the world that established the position of *professor extraordinarius* in the history of medicine, corresponding to our present associate professorship, as early as 1898.

Henry Sigerist was a pupil of Sudhoff and was to introduce a new spirit into the customary methods, which consisted mainly of the building of archives for medical reports of the past. Sigerist ceased to regard historical events as isolated

facts but tried to interpret them in the light of the cultural and social conditions of their times. It was a novel approach, which the next generation of medical historians adopted and kept up. Putting new life into what used to be a rather dry academic exercise made Sigerist the great teacher of so many who later became prominent leaders themselves. "It was he who changed the past into history," wrote Owsei Temkin in 1977. And even the students in medical school who attended his lectures outside their curriculum were fascinated by the freshness that his kind of history could evince. Sigerist outlined a new concept of historiography based on his conviction that the prevailing principles which govern an epoch in medicine are the same as those that prevail in the arts and sciences. What makes, for example, William Harvey's discovery of blood circulation so much a product of the baroque spirit is the introduction of function to physiology, an ideology present likewise in Michelangelo's works, Galileo's astronomical analysis, or the switch in physics from static to dynamic interpretions.

Sigerist left Leipzig temporarily to work for four years at the University of Zürich, where, to his great satisfaction, the title of professor was bestowed on him, and where he published four books besides several shorter articles, and founded the Swiss Society for the History of Medicine and Natural Sciences. Then, in 1925, at the age of thirty-four, he was called back to Leipzig to succeed Sudhoff, who was retiring as Director of the Medical Historical Institute and as chairman of the department of the history of medicine. A great number of studies appeared in print and his Institute attained a huge reputation. Many young scientists were attracted to this research center on the way to reaching prominence themselves, such as Owsei Temkin, later the leading medical historian in America, or Erwin H. Ackerknecht, who became professor for the history of medicine in Madison and Zürich, and Ludwig Edelstein, whose background as educator in philosophy and classical languages enabled him to make great contributions to his chosen field.

In 1932 Sigerist left Leipzig again, this time for the United States. He had been invited to join the faculty of Johns Hopkins University in Baltimore, where the first North American chairmanship in the history of medicine had been established six years before. William H. Welch, a faculty member at the School of Medicine, had occupied this chair and had founded an institute modeled after the one in Leipzig, which had impressed him deeply on his exploratory journey to Germany. This new institute was to become the foremost academic center in its field on the American continent under the leadership of, at first, Sigerist and then of Owsei Temkin, who had left Leipzig together with his mentor and later became the second of his successors.

Henry Sigerist realized the need for a revision of some basic principles of medical history. His critical mind could not go along with a "positivistic" approach that judged this branch of history mainly by its contribution to

progress. He hoped that ultimately the social sciences, classical philology, and philosophy would be integrated into the programs of medical schools. Social medicine and medical sociology were favorite topics of his studies several years before there was a pragmatic interest in public health. History had taught him that modern medicine ought to be available to everyone in America, and in full equality.

In 1933 Sigerist founded the *Bulletin of the History of Medicine*. His Institute produced a new generation of medical historians. George Rosen shared his chief's interest in the social history of medicine, and later became chairman of a department and professor of medical history, epidemiology and public health at Yale University. Genevieve Miller received her masters degree at the Johns Hopkins Institute and then became a very active and productive researcher and author as Director of the Howard Dittrick Museum of Historical Medicine in Cleveland and associate professor at Case Western Reserve University. Ilza Veith left the Baltimore Institute with a Ph.D. degree and now is professor of both the history of health sciences and of psychiatry at the University of California in San Francisco.

In 1947, at the age of fifty six, Sigerist decided to resign from his flourishing Institute in Baltimore. He felt qualified to concentrate on writing a most comprehensive work. He also was advised to slow down in his official duties for reasons of health—hypertension with signs of cardiac insufficiency. The political atmosphere of growing McCarthyism alarmed him when his studies on Soviet medicine were suspected as sympathetic with communism.

Henry Sigerist moved to Pura in the Italian section of Switzerland. He stayed there for the remaining ten years of his life but completed only a fraction of his ambitious project. The first volume of his complete *History of Medicine* was published, and dealt with paleopathology, primitive medicine, and archaic medicine. The second volume, on early Greek, Indian and Persian medicine, was left unfinished but was completed by Ludwig Edelstein.

Sigerist received many honors during his stay in Switzerland. In 1950 the International Conference on the Social History of Medicine was held at Pura in his honor. Sigerist was in his sixty-sixth year of life when he succumbed to a recurrent cerebrovascular accident.

The Johns Hopkins Institute for the History of Medicine has maintained its central position up to the present. In 1948 Richard H. Shryock became the new director and chairman. He was a general historian who had a special interest in medical history and the influence of social and economic conditions on the development of medicine. His hope was that some day the history of all sciences would be included in the sphere of the Institute. After ten years he was succeeded by Owsei Temkin, who was to have the probably greatest influence on contemporary history of medicine in America, even after becoming professor emeritus in 1968. The Johns Hopkins Institute now continues its tradition under

the present stewardship of Lloyd G. Stevenson.

New departments of history of medicine have now been created at several American universities. In 1967 Genevieve Miller reported that ten universities had added a graduate program to their lists; four of these, however, were offered not in medical schools but in departments of either history or history of science. The annual conventions of the American Association of the History of Medicine continue to encourage personal contact among its members from North America and abroad since its inception in 1925.

The biographical book of Elisabeth Berg-Schorn does not mention every name of importance but conveys the growth and development of the field of medical history since the begining of the twentieth century far beyond the single part which Sigerist played and as the title of the book might imply. More than half of the book is taken up by extensive commentaries, lists of documents, and graphs, as well as by a large bibliography of works written by Sigerist and many other authors involved in the subject.

Memoir of William Thomas Fitts, Jr.
1915-1980

Jonathan E. Rhoads, M. D.

WILLIAM Thomas Fitts, Jr. died on June 17th, 1980. in his sixty-fifth year. He spent his adult life in Philadelphia at the University of Pennsylvania, where he entered the medical school in 1936. In 1972 he became the Chairman of the Department of Surgery in the School of Medicine and the tenth John Rhea Barton Professor of Surgery since the Chair was founded in 1878. Dr. Fitts was widely known for his studies in the field of trauma and for a long-time interest in cancer of the breast.

Born in Jackson, Tennessee, he accompanied his father to Rochester, Minnesota, where his father took advanced training in internal medicine (and where the father of his second wife, also from Jackson, was taking advanced training in surgery). Later, when he returned to Jackson, he completed his secondary schooling and attended Union University, from which he was admitted to the School of Medicine at the University of Pennsylvania. He was an extremely able student and a conscientious one. He graduated first in the Class of 1940 from the University of Pennsylvania School of Medicine and on the basis of a special examination at the end of his fourth year won the Spencer Morris Prize for the student possessing the best all-around knowledge of medicine. Internship followed at the Hospital of the University of Pennsylvania where again his performance was truly outstanding, and he became committed to surgery.

He was an active participant when I. S. Ravdin organized the staff of the 20th General Hospital, and he went on active duty May 15, 1942, After several months of conditioning in the Mississippi Delta the unit was sent by ship across the Pacific south of Australia to India where they established the hospital in Assam, India near the Burmese border. During the life of the hospital its census rose to over 2000 patients, including men from the western allies and China as well as Japanese prisoners of war. In the words of the lated John Paul North, who became Chief of the Surgical Service when I. S. Ravdin became Commanding Officer, there were two men whom you could never overload. They handled all the work you could send to them and in an excellent manner. One of them was William T. Fitts.

Returning of Philadelphia at the end of the war, Dr. Fitts completed his surgical training with Dr. I. S. Ravdin and was appointed to the faculty. He

became a Division Chief in 1956 and Chairman of the Department in 1972. He held the John Rhea Barton Chair from 1972 to 1975 and at various times had appointments at the Philadelphia General Hospital, the Children's Hospital and the Philadelphia Veterans' Administration Hospital as well as the Hospital of the University of Pennsylvania. He was a member of the Philadelphia County, Pennsylvania State and American Medical Associations. He was elected to membership in the Society of University Surgeons, the American Surgical Association and the Southern Surgical Association. Other professional societies included the John Morgan Society, the Philadelphia Academy of Surgery, the College of Physicians of Philadelphia, the Halsted Society, the Society for Surgery of the Alimentary Tract, the Eastern Surgical Society, the Société Internationale de Chirurgie, the American Association of University Professors, the University of Pennsylvania Research Club, Sigma Xi, Phi Chi, the American College of Surgeons and the American Association for the Surgery of Trauma. He was particularly active in the last two organizations, serving on the Philadelphia Regional Committee on Trauma of the American College of Surgeons as its Chairman and later as Vice-chairman of the Trauma Committee of the College at the national level. In the American Association for the Surgery of Trauma he served as Secretary, Vice-president and President. In 1971 he took over the presidency of the American Trauma Society and set that organization on its feet. Dr. Fitts was co-author with Dr. Oscar Hampton of a monograph of *Open Reduction of Common Fractures* and with William S. Blakemore wrote *Management of the Injured Patient* in 1969. He wrote numerous chapters for textbooks, including the four chapters on fractures in each of the four editions of Lippincott's *Textbook of Surgery* with Dr. Oscar Hampton. He was Editor of *The Journal of Trauma* for six years and greatly expanded its circulation. He increased it from six to twelve issues a year during his period as Editor. Dr. Fitts was an Honorary Member of the Anchorage Medical Society and traveled widely lecturing on the treatmen of trauma. Included in his travels was a trip to West Africa.

Turning from the record to the person, Dr. William Fitts was not an easy personality to describe. As a surgeon he was painstaking and extremely conscientious. He had excellent judgment and did not strain at gnats. He was reassuring to patients and gave careful attention to their psychological needs as well as their physical needs. He was skillful and direct in the operating room and conservative in planning surgical care. His results were outstandingly good and he generally avoided any close calls.

A particular honor came to him in 1975 when the American Association for the Surgery of Trauma established a lectureship in his name which has been given annually ever since.

One of Dr. Fitts' last major undertaking was in connection with the Campaign for the Eighties to raise $255,000,000 for the University of Pennsylvania. He headed first the "on campus" campaign for the medical school and then the campus-wide campaign. Each of these campaigns was an outstanding success. It is fitting that in the week in which he died, our Vice-president for Development, Craig Sweeten, was able to report to the Trustees that the campaign had gone over the top, with two hundred fifty-five million one hundred-odd thousand dollars. It would not have been over the top had it not been for the funds raised under Dr. Fitts' chairmanship on the campus in general and in the medical school, in particular.

Much of his earlier research was done in the laboratory, though other aspects were clinical. For instance, he showed that the hepatic artery could be ligated in the dog without fatality if penicillin or aureomycin were administered, thus confirming and extending the studies of Markowitz on penicillin. He showed that the prognosis for breast carcinoma when it first appeared as an axillary metastasis was not as bad as was then believed and that many of these patients could be saved.

His studies of trauma victims with the Medical Examiner's Office in Philadelphia led to many improvements in the care of trauma.

It probably is as a teacher that Bill Fitts will be most greatly honored. He had an encyclopedic knowledge, not only in medicine and surgery, but outside his professional field. He used language well and was always clear and explicit and scrupulously honest in his statements. Perhaps his greatest message was one that he never needed to put into words-he really did put the patient first. This was shown in his faithfulness in making regular and unhurried rounds, his reluctance to take vacations, and the relatively few meetings which he attended which took him out of town or away from the people he was caring for. As the father of one of his patients, I appreciated not only his steadfastness but his willingness to devote time to explaining the situation both to the patient and to relatives. He communicated his devotion to patients, to his colleagues, and to his residents and students, and his example will stay with us all.

Memoir of Grayson Prevost McCouch (1888–1979)

John R. Brobeck

At the age of ninety years, Grayson Prevost McCouch died on August 2, 1979, at the Rutland Hospital not far from the family's summer home near Wallingford, Vermont. Although he suffered from mild diabetes for more than 60 years, and more recently was troubled with recurrent episodes of pain from an intervertebral disc, as well as with Parkinson's disease, he remained active and in his usual cheerful spirits until shortly before his death.

His widow, Margaret Sumwalt McCouch, has prepared an account of his life that includes information previously unknown to most of his friends. That he was born and reared in Chestnut Hill was common knowledge, together with his education for six years at Middlesex School in Concord, Massachusetts; his graduation from Harvard College in the distinguished class of 1911; his medical education at the University of Pennsylvania until 1915; and his service as a neuropsychiatrist at the U.S. Naval Base Hospital #5 in Brest near the end of the First World War. In 1919-20 he spent most of a year in Sherrington's laboratory at Oxford. Then in 1920 he joined Professors Edward T. Reichert and E. Lodholz in the Department of Physiology at the University of Pennsylvania. Grayson soon recommended to Newton Richards that H. C. Bazett be invited to come from Oxford as Chairman of the Department upon Reichert's retirement in 1921. Bazett, Merkel H. Jacobs, Samuel Goldschmidt and Grayson McCouch then made up the faculty of this department for nearly 30 years.

Margaret McCouch noted that Grayson's mother was the daughter of a Philadelphia physician, Grayson Mallet-Prevost, who served with the U.S. Army during the Mexican War, stayed on to practice medicine in Zacatecas, and married the daughter of the governor of the state. When he for a time returned with his family to Philadelphia, his daughter, Virginia, met and married Grayson's father, H. Gordon McCouch, a lawyer who grew up in Pittsburgh. Dr. Mallet-Prevost later went back to Mexico, where Grayson as a boy visited him.

Grayson's father established the family home in Chestnut Hill; he was associated with the law firm now called Drinker, Biddle & Reath. His oldest son, Gordon Mallet, studied painting under Howard Pyle, and eventually moved to Switzerland where he was active as a painter and as an amateur architect. The youngest of the three sons, Eric Alan, became a lawyer associated with his father's firm.

In 1918, Grayson married Cécile Kievits, a Belgian who had come to the Hospital of the University of Pennsylvania to study nursing. Their son, Gordon P., born in 1920, is now an electronics engineer in Concord, Massachusetts. Cécile died in 1940. A year later Grayson married Margaret Sumwalt, who formerly was a graduate student in the Department of Physiology, and who taught physiology at the University of Pennsylvania, at the Woman's Medical College, and later, at Temple University. Their son, Donald G., is an officer in the International Division of Manufacturers Hanover Bank of New York.

The first three papers of Grayson's bibliography, published before he became a physiologist, represent his initial interest in pathology. The fourth paper, however, on the relation of the pyramidal tract to spinal shock, began his lifelong devotion to the spinal cord. He studied reflex phenomena in spinal animals, recovery of function following spinal cord transection, regeneration of axons within the cord, and potentials from both presynaptic and postsynaptic loci. The most widely quoted of his results concerns localization of receptors for tonic neck reflexes within ligaments of the upper joints of the neck. His collaborators included the following: Baldwin Lucké in one of the early papers in pathology; Alexander Forbes, neurophysiologist at Harvard, Bernard Alpers, neurologist first at the University of Pennsylvania, then for many years at Jefferson; Frank Adler, later, head of the Department of Ophthalmology at Penn.; John Fulton, neurophysiologist at Yale; Winifred Stewart and Joseph Hughes of the Institute of Pennsylvania Hospital; George Austin, a neurosurgeon then at HUP; and William Chambers and Chan-nao Liu of the Department of Anatomy. Grayson continued his research long after his official retirement in 1953; alone and with co-authors his bibliography includes some 20 titles after that date. He once stated that the major influences in his professional life were Sir Charles Sherrington, A. Newton Richards, H. Cuthbert Bazett, Merkel H. Jacobs, John Fulton, and his own research colleagues.

Through his research and also through attendance at the triennial meetings of the International Union of Physiological Sciences, Grayson became personally acquainted with neurophysiologists from all parts of the world. Lord Cohen of Birkenhead, listing the more distinguished of Sherrington's associates, gave the names of Harvey Cushing, Fröhlich, Weed, Magnus, Bazett, Cobb, Penfield, McCouch, Florey, Granit, Fulton, Forbes, Eccles, Graham Brown, and "many others" ("Sherrington...", Liverpool U. Press, 1958). Similarly, in his "Appraisal" of Sherrington, Ragnar Granit wrote: "Sherrington was a teacher of many young men who later remembered him with gratitude...", and mentioned Russell Brain, Stanley Cobb and Gordon Holmes, neurologists; Bazett, Lord Florey, the Hoff brothers, Grayson McCouch, and "many others" as physiologists ("...Sherrington...", Doubleday & Co., 1967). It is clear that Grayson was regarded by his peers as a member of a truly distinguished generation of investigators of the nervous system.

His friends knew this, of course. We remember as well his own unique variety of kindliness, gentleness, and courtesy; his always youthful perspective on life; the meticulous attention he gave to preparation of an experiment, whether for teaching or for his research; his tendency to drift off to sleep when he was attending a lecture, even while he was standing at the back of the room so as to be sure he stayed awake; his habit of slicing a banana as garnishment for the soup de jour in the departmental lunch room; and his characteristic, infectious laugh. It was no accident later, in letters of appreciation from his friends to Margaret after his death, three quoted this sentence from Chaucer, "He was a veray parfit, gentil, knyght."

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